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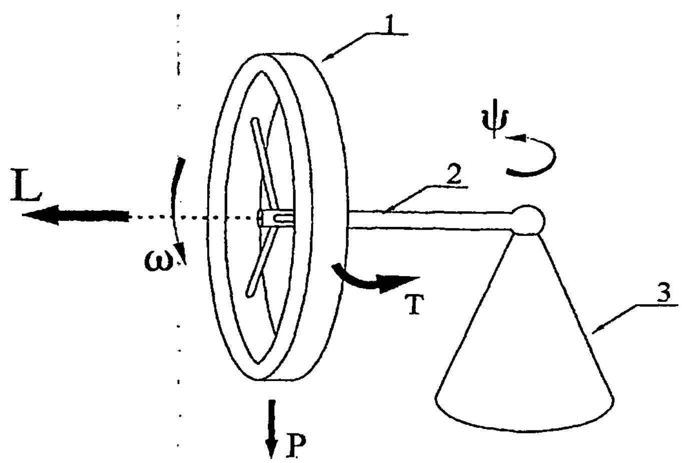
(54) Title: AN INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR



(57) Abstract: This invention refers to an electro-electronic and quantum-mechanical system, which has the function of generating and controlling inertia. It includes one or more superconductor elements whose purpose is to act as the base for two or more circular flows of electrons, where they are subjected to critically dimensioned electromagnetic excitation, which brings the conduction current close to the cut-off limit and thus accelerates the flow to relativistic velocities, with the aim of dilating the masses of the rotating electrons thus generate a controllable macroscopic quantum angular momentum.The points where the electrons are accelerated in a circular fashion, are distributed geometrically around an axis, so that with the use of an electronic control device it is possible to energize them alternately or in sequence, therefore avoiding the cancellation of the torques produced by the opposing angular momentums, when the superconductor element(s) are placed in a precession movement. To optimize yield, we can submit the superconductor elements simultaneously to precession and rotation movements, in which case, when the direction of the electrons is the same as the rotation, we encounter an amplification of the angular momentum, whilst when the direction is the opposite of the rotation, we encounter a total cancellation of the angular movement.

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"AN INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR."

This invention refers to an electro-electronic and quantum-mechanical system, which has the properties of generating acceleration as well as being able to control the gravitational field. Depending on the characteristics of its construction, geometric arrangement, and energizing configuration, it can self-propel or levitate, as well as reduce, nullify or increase the effects of a gravitational field upon itself.

Gravity and gravitational control have long been objects of study, and the search for ways to improve or replace traditional means of transport is a constant. Recently, scientists at the University of Tampere in Finland accidentally discovered anti-gravitational effects using ceramic disks with super conducting properties, their best result on that occasion being a gravitational variation of -2.1%. The new effect was not very well understood at the time, and no acceptable physical explanation was found. The phenomenon was to a material property, namely Bose condensation.

A number of patents have already been filed relating to anti-gravitational systems or appliances. At the time of writing, however, it is not known whether any have been successful or been shown to be functional. Brazilian patent PI9904625 has similar configurations to the Tampere experiment. There is also the example of patent US005557988A for a centripetal impulsion vehicle, which only works in microgravity environments. Another system is the Japanese patent P2000-110706A, which works through the rotation of five linked eccentrics. The German patent DE19832001A1, which is based on the spiral rotation of a superconductor cone, has the greatest potential to match the functioning of the present invention, as it also works from the principal of the relativistic mass of electrons.

A result of the Quantum Gravitational Theory (QGT), a new physical theory that explains gravity to be consequence of the relativistic difference of the nuclear forces, the invention described here possesses all the characteristics necessary to initiate a new industrial or technological revolution, much as the electric motor and the automobile did in the last century, or the computer and information technology of the last decades.

These gravitational control rotors could be used as basic drive elements in the design of the most varied transportation systems, as well as finding a vast range

of uses in industry and, in all probability, in a multitude of everyday applications.

An example can be cited from the field of medicine. Suppose, for example, that the DNA molecule, from its conception or initial make-up, undergoes geometric alterations caused by "**gravity – time**". These alterations may eventually result in mutations in areas within the molecule which are naturally fragile because of their genetic origin. These mutation, which can also be caused by radiation or natural aging, may produce illnesses such as cancer, for which there is currently no effective cure.

The following description and figures, all under the heading of non-limited example, will better explain the invention.

Figure 1 shows a conventional flywheel in natural rotation and precession, where we can identify the torque and force vectors involved in the system, and the direction of the rotation of the moving parts.

Figure 2 shows a simplified schematic cross section of the flywheel in figure 1, which identifies the vectors and dimensions involved.

Figure 3 shows two rigidly connected flywheels, identical to the one in figure 1, except that the rotation and precession are powered by motors.

Figure 4 shows a simplified cross section of the assembly in figure 3, where we can identify the dimensions and the force and torque vectors resulting from the simultaneous rotation of the flywheels and precession of the assembly.

Figure 5 shows two graphs of current against time, one for each superconductor (in the case of rotors with two superconductor elements), demonstrating the alternation of the current at time intervals "Δt_a and Δt_b".

Figure 6 shows two graphs of torque against time, one for each superconductor (in the case of rotors with two superconductor elements), demonstrating the alternation of the torque, and consequently of the resulting angular momentum and forces, at time intervals "Δt_a and Δt_b".

Figure 7 shows two graphs (the first for time interval "Δt_a" and the second for time interval "Δt_b"), of the resultant torque and force vectors for each superconductor ring (in the case of rotors with two superconductor elements).

Figures 8, 9 and 10 show some possible forms of the ceramic

superconductor elements applied to rotors with simultaneous rotation and precession, namely ring, torus and coil, respectively.

Figure 11 shows a simplified schematic cross section of a system equivalent to that shown in figure 3. This arrangement includes a complete rotor assembly, powered by only one motor. The flywheels in figure 3 have been replaced with cages where the superconductor elements and their electrical energizing systems can be found.

Figure 12 shows in simplified form the cross section "aa" indicated in figure 11. A number of details have been omitted for clarity.

Figure 13 shows a system equivalent to the rotor in figure 11, but in greater detail.

Figure 14 shows how the excitation of the superconductors could be carried out. A soft iron core is wound round the crystal, and amplified detail of the primary winding is shown.

Figure 15 shows, in a very simplified form, one option for an electro-electronic circuit used to energize the superconductor rings, where the basic parts which make up a rotor with two superconductor elements can be seen.

Figure 16 shows another electro-electronic circuit, which could be used to energize rotors with coil superconductors, using in this case a current transformer (21).

Figure 17 shows a simplified cross section of a system equivalent to that in figure 11, but with superconductor rings at an angle Φ not equal to 90°, in relation to the axis of rotation or precession plane.

Figure 18 shows in simplified form the cross section "aa" indicated in figure 17. A number of details have been omitted for clarity.

Figure 19 shows in simplified form a cross section of the rotors in figures 11, 12 or 13, where the ceramic superconductors are in precession but not rotation.

Figure 20 shows a greatly simplified cross section of the rotor shown in figures 17 and 18. In this option, the ceramic superconductors, as well as being only in precession, are also at an angle Φ not equal to 90°, in relation to the precession plane.

Figures 21, 22 and 23 show some possible forms of the ceramic superconductor elements applied to rotors with precession but without rotation, namely

disk, cylinder, and cone, respectively.

Figure 24 shows the energizing of a superconductor disk (16), through a soft ferromagnetic core, where primary winding can also be done with superconductor material.

Figure 25 shows the magnetic flux passing through the superconductor and the direction of the rotation of the superelectrons, which oppose the penetration of the magnetic flux when it is in a superconducting state.

Figure 26, shows four graphs of current and torque against time, demonstrating energization of a rotor with four superconductor elements, where they do not have rotation, but only precession around an axis.

Figure 27 shows four perspective diagrams (one each for time intervals t_1, t_2, t_3 and t_4 shown in figure 26) demonstrating the resultant torque and force vectors for each superconductor element, in the case of a rotor with four superconductor elements, or four energizing points

Figure 28 shows a simplified schematic cross section of a rotor with four ceramic superconductors in the form of a disk (similar to that in figure 21) and their electrical energizing systems (as shown in figure 24). This system is a complete rotor assembly, subject only to precession.

Figure 29 shows in simplified form the cross section "aa" indicated in figure 28. A number of details have been omitted for clarity.

Figure 30 shows a simplified schematic cross section of a rotor with one ceramic superconductor in the form of a cylinder (similar to that in figure 22), which is energized at four equidistant points by electrical systems similar to those shown in figure 24. This system shows a complete rotor assembly, subject only to precession.

Figure 31 shows in simplified form, the cross section "aa" indicated in figure 30. A number of details have been omitted for clarity.

Figure 32 shows a simplified schematic cross section of a rotor with one superconductor, in the form of a cone (similar to that in figure 23), which is energized at four equidistant points by electrical systems similar to those shown in figure 24. This system shows a complete rotor assembly, subject only to precession. The circular plane of electron flow is at an angle Φ not equal to 90°, in relation to the precession plane.

Figure 33 shows in simplified form, the cross section "aa" indicated in

figure 32. A number of details have been omitted for clarity.

Figures 1 to 4 have the basic function of aiding with the theoretical and technical description of the working of the invention. In figure 1 and 2 we have a flywheel (1) fixed to a shaft (2) in such a way that it can rotate freely, and furthermore supported on a base (3) so that the whole assembly can precess. The flywheel (1) has mass **m**, height **h**, external radius **re** and internal radius **ri**, and other information as indicated in figure 2. From classical mechanics, we know that this body has an inertia moment **I** equal to:

$$I = \frac{1}{2}.m.(r_e^{\,2} + r_i^{\,2}) \qquad \left[kg.m^2\right] \qquad Eq.\ 01$$

When the flywheel (1) is set in a given rotation ω, we have the generation of an angular momentum **L**, given by:

$$L = I.\omega \qquad \left[kg.\frac{m^2}{s}\right] \qquad Eq.\ 02$$

From the law of conservation of angular momentum, we know that this flywheel (1) due to the force or weight **P** (result of the action of earth's gravity **g** on its mass **m**) will generate a torque **T**, given by :

$$T = I.\omega.\psi = m.g.r_r \qquad \left[N.m \;\; or \;\; kg.\frac{m^2}{s^2}\right] \qquad Eq.03$$

This equation requires that the torque be perpendicular to the plane formed by the radius of the rotor **rr** and by the force **m.g**. On applying the right hand rule, we can see that the direction of the torque vector **T**, represented in figure 2, is going out of the page. This torque **T** will make the flywheel (1) undergo a natural precession ψ_N around the base (3), which is given by:

$$\psi_N = \frac{m.g.r_r}{I.\omega} \qquad \left[\frac{1}{s}\right] \qquad Eq.\ 04$$

In the assembly shown in figure 3, the motors **Mv** were included to drive the flywheels (1), and the motor **Mr** on the base (3), in order to rotate the entire assembly. This way, the flywheels maintain the rotation ω whilst the whole unit is subject to a forced precession ψ.

In figure 4 we have a diagram showing the resultant vectors of the assembly shown in figure 3, where we can see that the torques **T**1 and **T**2, result from the two motors **Mv** placed in precession by the motor **Mr**. These torques have the same modulus, that is to say, they are equal but opposite. If we consider that the system is rigidly connected, we note that these torque cancel each other.

Comparing figures 3 and 4 with figures 1 and 2, we note that with this motor-induced movement, or forced application of torque, the directions of the weight vector **P** (figures 1 and 2), the force vectors **F**1 and **F**2 (figures 3, 4 and 7) and the torque vectors **T** (figures 1 and 2), **T**1 and **T**2 (figures 3, 4 and 7), undergo a movement of 90°, and now take up a new direction, always obeying the right hand rule, as previously described.

Since these two torques are simultaneous and opposite, they cancel each other, and consequently generate no residual force. For the system illustrated in figures 3 and 4, we therefore have a net torque of zero, and consequently no residual forces. For this not to happen, we must quickly **alternate** these torques at a given frequency θ, so that they are **not** simultaneous, so that when one is active the other must be inactive. In this way we will arrive at a non-zero net result, which will be force **F**3, represented in figure 7.

In order for the system to function as intended, having a non-zero resultant acceleration directed either against or with gravity, we must incorporate flywheels or inertia units which have the ability to control its angular momentum. This is obtainable through the use of elements made of ceramic superconductors (S.C.).

These S.C. ceramics can be of many shapes, with the object being to obtain different gravitational effects. Some geometric possibilities are illustrated in figures 8, 9, 10, 21, 22, and 23, and include shapes such as the ring, torus, coil, disk, cone, cylinder and sphere, or even combinations of these, always with the aim of obtaining a high moment of inertia, and permitting easy energization.

For a crystal to assume the property of superconduction, it needs to be below the characteristic critical temperature of each S.C., which is achieved through the use of liquid nitrogen or helium. To simplify the drawings, these substances and their refrigeration and manipulation systems have been omitted, but it is evident that their presence is necessary for the rotor to work.

These superconductor rings are subjected to forced electromagnetic induction at such a rate that the current nears its cut off point, giving a flow of accelerated electrons at relativistic velocities. An electronic current-locking device (as shown in figure 5) allows control of the alternation of their angular momentum (as shown in figure 6), through changes in the direction of the electrons. When the direction of the electrons is the same as the rotation, we have an amplification of the angular momentum; when this situation is reversed, we can have a total cancellation of the angular momentum.

From the figures 5, 6, and 7, we can see what happens with the currents, torques or angular momentums, and forces, respectively, in a rotor built with two S.C. rings (**S.C.1** and **S.C.2**). In figure 7, we can also identify the centrifugal force vector (F cfga.), which functions to stabilize the system. For this reason, the greater its intensity, the more balanced the rotor will be. We also note that in the time period Δ**t**a we have only the generation of force F1, whilst, in the period Δ**t**b we have only the generation of force F2. In this way, we alternate the generation of torque, avoiding their cancellation.

In figures 11, 12, and 13, we show a rotor powered by only one motor (11), where the two rings (6) are moved via three conical gears (10), giving simultaneous rotation and precession. To simplify the drawing, the superconductor elements and electrical energizing systems have been omitted, but there location is indicated (6). These rings or controllable angular momentum units (6), are fixed in a device (7) mounted on ball bearings (9), enabling its rotation. In turn, this device (7) is fixed in a cage (8), also on bearings, permitting simultaneous precession.

The whole mechanism must be installed in an appropriate receptacle, in order to make the refrigeration of the rings possible, thus the need for casing (12). In figure 13 we can identify the contact bearings (13), separated by spacers (22) which enable the energizing of the rings whilst they are in rotation.

We calculate the forces **F**1 and **F**2, which originate in torques **T**1 and **T**2, identified in Figure 7, as follows:

$$F1 = \frac{T1}{r_r}\ [N] = F2 = \frac{T2}{r_r}\quad [N] \qquad Eq.05$$

Force **F**3, shown in figure 7, is the resultant force directed against gravity. If we can cancel the weight of the entire rotor assembly, we would then obtain an acceleration without mass, creating an anti-gravitational effect. The strength of force **F**3 is calculated as follows:

$$F3 = \frac{F1}{2}\ [N] = \frac{F2}{2}\ [N] \qquad Eq.06$$

If we make the rotation frequency ω and precession frequency ψ equal, where the latter also represents the frequency of the motor ω_M, we can determine the torques **T**1 and **T**2, as follows:

$$T1 = T2 = I.\,\omega.\,\psi = I.\,\omega_M^2 \qquad [N.m] \qquad Eq.07$$

We know that the torque "TM" and rotation "ω_M" of a motor, are proportional to its power, so, we have:

$$Power\ \ of\ \ Motor = T_M.\omega_M \quad \left[W\ \ or\ \ N.m\ \ or\ \ \frac{kg.m^2}{s^3}\right] \quad Eq.08$$

Since the torque supplied by the motor represents the sum of the torques of the system (in the case of a rotor powered by only one motor, as in figures 11, 12, and 13) or **T**1 = **T**2 = **T**M, we can calculate **F**3 , in the following way:

$$F3 = \frac{Power\ \ of\ \ Motor}{2\,.\,r_r\,.\,\omega_M} \qquad [N] \qquad Eq.\,09$$

We can see in equation 9 that the resultant force **F**3 is inversely proportional to the radius of the rotor $\mathbf{r_r}$ and the rotation of the motor ω_M.

Analyzing the vector diagram in figure 7, we can see that the centrifugal force (F cfga.) is of fundamental importance for the efficient running of the rotor. We can see that it works as if it were a virtual support or reference. This force must be dimensioned to a minimum, in such a way as to contribute positively to the stability of the system.

The force must be dimensioned so as to maximize the output of the forces generated by the torque, and is calculated as follows:

$$F_{CFGA.} = m.\psi^2.r_r \qquad [N] \qquad Eq.10$$

Analyzing equations 9 and 10, we see that the radius of the rotor $\mathbf{r_r}$ cannot be very small (or tend to zero), or the centrifugal force will become very small and therefore would make the rotor unstable. On the other hand, the precession velocity ψ must be as high as possible, in order to compensate for a small rotor radius $\mathbf{r_r}$. We will see later that we must take into consideration the value of the energizing frequency θ of the superconductor elements in the dimensioning of the rotor radius $\mathbf{r_r}$ and precession velocity ψ.

For an initial dimensioning, however, we can calculate:

$$F1 = F2 = 2.\,Fcfg. = \frac{T}{r_r} = \frac{I.\varpi.\psi}{r_r} \qquad [N] \qquad Eq.\,11$$

Analyzing the case of the system in figure 3, making ψ equal to ω, and taking into account equation 11, we deduce that the radius of the rotor $\mathbf{r}_r$ must be:

$$r_r = \frac{\sqrt{(r_e^{\,2} + r_i^{\,2})}}{2} \qquad [m] \qquad Eq.\,12$$

For dimensioning these types of rotors, we must determine the mass of the superconductors, and to do this we must first determine their volumes. For the S.C. in the form of a ring, as illustrated in figure 8, the volume is calculated as follows:

$$Vol_{S.C.} = \pi . h . (r_e^{\,2} - r_i^{\,2}) \qquad [m^3] \qquad Eq.\,13$$

Whilst for the S.C. in the form of a torus, as illustrated in figure 9, the volume is calculated as follows:

$$Vol_{S.C.} = \frac{\pi^2}{4} . (r_e + r_i)(r_e - r_i)^2 \qquad [m^3] \qquad Eq.\,14$$

To calculate the mass of the S.C., we proceed as follows:

$$m_{S.C.} = Vol_{S.C.} \cdot \mu_{S.C.} \qquad [kg] \qquad Eq.\,15$$

Where : $\mu_{S.C.}$. is the specific mass of the superconductor.

As an example of specific mass, we can quote a cite a monocrystal ceramic superconductor based on Y Ba2 Cu3 Ox-7, which has an average value equal to 5.527 [Kg/dm^3].

So, the $\mathbf{m}_{S.C.}$ obtained from the equation 15 is the necessary mass, which we must generate by accelerating the flow of electrons to relativistic velocities in the opposite direction to the rotation, so that it can cancel out the angular momentum.

To cancel out the angular momentum $\mathbf{L}_{S.C.}$ of the S.C. ring in rotation, we must have an equal angular momentum of the electrons $\mathbf{L}_{electrons}$, but in the opposite

direction to the rotation of the S.C., $\omega_{S.C.}$, such that, $\mathbf{L}_{electrons} = - \mathbf{L}_{S.C.}$

We thus have:

$$L_{S.C.} = IN_{S.C.} \cdot \omega_{S.C.} = L_{electrons} = IN_{electrons} \cdot \omega_{electrons} \qquad \left[kg.\frac{m^2}{s}\right] \qquad Eq.\,16$$

Where : $\mathbf{IN}_{electrons}$ is the moment of inertia of the electrons in rotation in the S.C.

$\mathbf{IN}_{S.C.}$ is the moment of inertia of the S.C.

$\omega_{electrons}$ is the average angular velocity of the electrons in the S.C.

Solving and simplifying equation 16, we find the mass of the electrons:

$$m_{electrons} = \frac{m_{S.C.} \cdot \omega_{S.C.} \cdot 2.\pi.r_m}{v_{electrons}} \qquad [kg] \qquad Eq.\,17$$

Where : $\mathbf{r}_m$ is the weighted average radius of the S.C. ring.

$\mathbf{m}_{electrons}$ is the relativistic mass of the electrons in rotation in the S.C.

$\mathbf{v}_{electrons}$ is the velocity of the electrons in rotation in the S.C.

From the theory of relativity, we know that a given mass in movement has its mass dilated in relation to an inertial observer in proportion to its velocity according to the following equation:

$$m_{electrons} = \frac{m_{o\ electrons}}{\sqrt{1 - \frac{(v_{electrons})^2}{c^2}}} \qquad [kg.] \qquad Eq.18$$

Where : $\mathbf{c}$ is the velocity of light in a vacuum, (299,792,246 m/s).

$\mathbf{m}_{o\ electrons}$ is the rest mass of the electrons in the S.C..

So, to obtain the greatest efficiency, we must accelerate the electrons as near as possible to $\mathbf{c}$ (the velocity of light), so that $V_e \Longrightarrow \mathbf{c}$. In this case, equation 18 is:

$$m_{electrons} = \frac{m_{S.C.} \cdot \omega_{S.C.} \cdot 2.\pi.r_{m.}}{c} \qquad [kg] \qquad Eq. 19$$

From Quantum Gravitational Theory (QGT), is can be determined that the electrons in the superconductor must be displaced at a velocity of:

$$v_{electrons} = \sqrt{\left(1 - \frac{m_{o\ electron}^{2}}{m_{o\ proton}^{2}}\right).c^2} \qquad \left[\frac{m}{s}\right] \qquad Eq.\ 20$$

Where : $\mathbf{m_{o\ proton}}$ is the proton rest mass.

$\mathbf{m_{o\ electron}}$ is the electron rest mass.

This velocity is slightly less than the velocity of light **c**, that is, it is compatible with a necessity for a relativistic velocity, however, the most important thing for the dimensioning of the rotors, is to determine the **quantity of electrons** that are going to participate in this flow. This quantity will give the dimension of the mass in rotation.

We know that the electrons in the superficial layers of the S.C. are responsible for the expulsion of the magnetic field from inside the S.C., being accelerated electrons to relativistic velocities and having their masses dilated. The quantity of electrons which participate in this displacement depends on the depth of penetration λ_N of the magnetic field, and this variable depends on the type of S.C. used. A typical value for λ_N is from 10^{-4} m to 10^{-5} m. (for a monocrystal ceramic superconductor, type II based on Y Ba2 Cu3 Ox-7).

For the toroidal S.C. illustrated in figure 9, we can calculate the superficial volume which participates in the conduction of the current with the

$$Vol_{S.C.} = \pi^2 \ . \ (r_e^2 + r_i^2) \ .\lambda_N \qquad [m^3] \qquad Eq.\ 21$$

following equation:

From the BCS theory, we know that electrons flow in pairs in a S.C., and

are known as Cooper Pairs, or superelectrons, which we will represent with the symbol $2e^-$.

We know that a superconductor has a large quantity of $2e^-$, and we estimate the density to be 10^{18} to 10^{19} per cm^3.

Therefore, the total number of electrons in circulation in the superficial volume (equivalent to 2 times the number of Cooper pairs $2e^-$) is approximately:

$$N^o_{electrons} \cong Vol_{S.C.}(cm^3).\ 2\ .\ 5.10^{18}\left(\frac{electrons}{cm^3}\right) \qquad [electrons] \qquad Eq.22$$

By substitution of equations 16,17 and 18, we find the relativistic velocity of these electrons, as follows:

$$v_{electrons} = \frac{m_{S.C.}\ .\ \omega_{S.C.}\ .\ 2\ .\ \pi\ .\ r_m}{\sqrt{1+\left(\frac{m_{S.C.}\ .\ \varpi_{S.C.}\ .\ 2\ .\ \pi\ .\ r_m}{m_{o\ electron}\ .\ N^o_{electrons}\ .\ c}\right)^2}\ .\ m_{o\ electron}\ .\ N^o_{electrons}} \qquad \left[\frac{m}{s}\right] \qquad Eq.\ 23$$

We note that this velocity of the superelectrons is compatible with, or very nearly reaches, the velocity obtained by the QGT in equation 20.

To calculate the current **I** necessary for a S.C. to cancel out its angular momentum, we proceed:

$$I_{S.C.} = \frac{q(A.s).\ v_{electrons}\left(\frac{m}{s}\right).\ N^o_{electrons}}{2.\ \pi.\ r_m.(m)} \qquad [A] \qquad Eq.24$$

Where : **q** is the elementary charge [$1.6217733\ .10^{-19}$ A.s]

We can compare this value with those obtained in laboratory experiments where the S.C.s. are submitted to extreme magnetic fields, whereupon the superficial currents reach values of 10^5 to 10^7 Amps per cm^2.

In the case of the torus in figure 9, we can determine the approximate conduction current in the superficial area, through the equation:

$$I_{S.C.} = \pi^2 . \left(r_e^2 - r_i^2\right) \left[cm^2\right] . \ 10^7 \left[\frac{A}{cm^2}\right] \qquad [A] \qquad Eq.25$$

Since each S.C. crystal has different characteristics in terms of current capacity, cut-off temperature, critical magnetic field, density of Cooper Pairs, specific mass, depth of penetration, and so on, all of which create different properties, we must have a different dimensioning for each case.

Amongst an infinity of possibilities, we present in Figures 15 and 16, two different options for electric circuits for the energizing of superconductor elements. Here we can see the oscillator (17), which supplies the alternating current necessary to energize the S.C.s. These figures also show the casing (18), for thermal isolation of the S.C., to maintain the necessary critical temperature.

In this case we know that the S.C. rings must have a simultaneous rotation movement, which is enabled through the rotation axis (19), and precession axis (20). To make the powering of the S.C.s possible in these simultaneous movements, it is necessary to use contact bearings (13), which must be assembled extremely carefully to ensure the correct running of the system.

In figure 14, we have an option as to how to induce a secondary current (16). In this case, the S.C. is a torus. Here a transformer with a soft iron core (14) is used, with a primary winding along its whole surface, thus covering the ceramic superconductor, as shown in the amplified detail in figure 14.

In figure 15, we can more easily identify the assembly of a rotor with two S.C.s energized as in figure 14. In this case, we make the magnetic field go through the ring, the number of times necessary to amplify it to the energizing, or primary, current needed to reach the required secondary current in the S.C.

For the scheme in figure 15, we can calculate the primary current approximately, with relative precision (the more correct form would be to consider the losses in magnetic yield in this geometry), through the following equation:

$$I_{\text{Primary}} \cong \frac{I_{\text{Secondary}}}{n_{Cu} \ . \ n_{Fe}} \qquad [A] \qquad Eq.26$$

Where : n_{Cu} is the number of primary winds (copper wire).

n_{Fe} is the number of soft iron winds to amplify the magnetic field.

$I_{Secondary}$ is the current in the S.C.

$I_{Primary}$ is the current in the primary coil or control current.

The energy necessary for this energization is at least:

$$Energy = c \cdot v_{electrons} \cdot m_{electrons} \cdot N^{\circ}{}_{electrons} \qquad [J] \qquad Eq.27$$

If we consider the losses, to maintain the intensity of the angular momentum of the electrons during the energizing period, or when the rotor is generating inertia, the consumption of energy will be above that obtained in equation 27.

As we have seen before, in order to dimension the radius of the rotor $\mathbf{r}_r$, we have to take into consideration the energizing frequency θ. To have smooth acceleration against gravity, and thus good stability, we must have an **"optimized"** quantity of anti-gravitational impulses, or the number of times that the S.C.s are energized per rotation.

This variable will also define the precession velocity ψ.

$$\Psi = \frac{\theta}{N^{\circ}\ impulses\ \ per\ rotation} \qquad \left[\frac{1}{s}\right] \qquad Eq.\ 28$$

As we have seen from equations 10, 11 and 12, this synchronization influences the dimensioning of the radius of the rotor $\mathbf{r}_r$. We can see here the importance of the relationship between precession velocity ψ and energizing frequency θ. Depending on the values assigned to these variables, one can obtain many different effects for many purposes.

In figures 17 and 18, we have the case of a rotor where the superconductor elements have been assembled at an angle Φ not equal to 90°.

For this type of assembly, we can adopt almost all the formulae shown

above, with the exception of the torque calculation, for which an alteration is necessary as shown in the following equation:

$$T1 = T2 = I.\,\omega.\,\psi.\cos\Phi = I.\,\omega_M^2.\cos\Phi \qquad [N.m] \qquad Eq.29$$

In these cases, we will always have lower efficiency, however we wish to point out one advantage, which is that the generation of inertia, although not homogenous, is in a larger area.

There is another way to generate controlled inertia, and this is done by accelerating the electrons alternately in one direction only. It is **not** necessary to have **rotation** of the rings or superconductor elements, but **only precession**, in accordance with figure 19, or figure 20, for the case of an angle "Φ"not equal to 90°.

In these cases, the angular momentum is obtained only with the flow of the electrons. This option has the advantage of simplifying the mechanics of the rotor, as well as demanding less of the S.C.s, which do not react well to high frequency alternated currents. For this type of energization, the values of the currents shown in figure 5 do not register a negative result.

Rotors which are built this way, with the electron flow polarized always in the same direction and without the necessity of rotation, but only precession of the superconductor elements, can use other forms of ceramic superconductors. Some of these many options are illustrated in figures 21, 22 and 23.

Rotors which use these forms can be seen in figures 28, 29, 30, 31, 32 and 33. They have four points at which the controllable angular momentums are generated. These points are distributed equidistantly and in a circular form around the precession axis. Figures 28 and 29 show a rotor with a superconductor element in the form of a disk (fig 21). Figures 30 and 31 show a rotor with na element in the form of a cylindrical or tubular casing (fig 22). Figures 32 and 33 show a rotor with an element in the form of a conical casing (fig 23). In this case we have an angle "Φ"not equal to 90°. Figures 24 and 25 show the energizing of each superconductor is done

In figure 26 we have four graphs, one for each S.C., with the energizing sequence, where we can see the torque and the currents generated against time. We should remember that the S.C.s are not rotating in this case, but only precess around an

axis. Figure 27 shows in perspective, in four diagrams (one for each time interval, $\mathbf{t}_1$, $\mathbf{t}_2$, $\mathbf{t}_3$ and $\mathbf{t}_4$, indicated in figure 26), the vectorial result of this energization, where one can see the torques and forces at the four different moments, and the force **F3** resulting from each interval. Since we always have two energized superconductors, energy **F3** has double the intensity.

For rotors of this type, we must first determine the angular momentum of the electrons $\mathbf{L}_{\mathbf{electrons}}$ (see equation. 17). We know that this must be calculated through the moment of inertia of the electrons whilst in circular motion $\mathbf{IN}_{\mathbf{electrons}}$, so we have :

$$L_{electrons} = IN_{electrons} \cdot \omega_{electrons} \quad \left[kg.\frac{m^2}{s}\right] \qquad Eq.\ 30$$

We determine the electrons' inertia moment $\mathbf{IN}_{\mathbf{electrons}}$, by:

$$IN_{electrons} = \frac{1}{2} \cdot \frac{m_{o\ electron} \cdot N^{o}_{\ electrons}}{\sqrt{1-\frac{(v_{electrons})^2}{c^2}}} \cdot \left(r_e^{\ 2} + r_i^{\ 2}\right) \quad \left[kg.m^2\right] \qquad Eq.\ 31$$

Since in this case we have a disk, we know that the internal radius $\mathbf{r_i}$, tends to zero, so $\mathbf{r_i} \Rightarrow 0$.

The angular velocity of the electrons in the S.C., $\boldsymbol{\omega}_{\mathbf{electrons}}$, is different for each electron, since each one is at a different distance from the center of the disk (in the case of the rotor illustrated in the figures 28 and 29 with the disk-shaped superconductor element shown in figure 21) so, we have:

$$\omega_{electron}(n) = \frac{v_{electrons}}{2 \cdot \pi \cdot r_{electron}(n)} \quad \left[\frac{1}{s}\right] \qquad Eq.\ 32$$

Now we finally calculate the angular moment through a sum, as follows:

$$L_{electrons} = \sum_{n=1}^{N^{\circ}_{electrons}} .IN_{electrons} \cdot \omega_{electron}(n) \qquad \left[kg.\frac{m^2}{s}\right] \qquad Eq.\,33$$

We can now determine the torques through the following equation:

$$T1 = T2 = T3 = T4 = L_{electrons} \cdot \psi \cdot \cos\Phi \qquad [N.m] \qquad Eq.34$$

In the case of the rotor shown in figures 32 and 33, and if we were to make the angle Φ approach 180°, we would then have a S.C. in the form of a disk with a hole or flange, and instead of four, only two energizing points, and would therefore have a configuration similar to the Finnish experiment. This configuration created an inertial shield which reduced, in a non homogenous manner, the gravity value of the volume up to a few meters above the area delimited by the surface of the disk, as a consequence of the use of high frequencies, and due to the higher weight of all the apparatus used. Through equation 34, we can see that the torque tends to zero, unless, for some reason, this magnetically levitatated disk oscillates and does not remain perfectly level. In this case we would have a small and unstructured generation of inertia, which is exactly what happened during the experiments at the University of Tampere.

CLAIMS

1. "INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR" characterized by having two or more superconductor elements (16) subject to simultaneous movement of rotation and precession, distributed around a precession axis, maintaining equal spacing and energized alternately or in sequence by electromagnetic induction, thus obtaining superconduction which accelerates the flow of electrons on the surface of the superconductors to relativistic velocities with the aim of dilating their masses, amplifying or canceling out the angular momentum of the rotating superconductors, in order to generate a controllable macroscopic quantum angular momentum.

2. "INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR" characterized by having two or more superconductor elements (16) distributed around, and maintaining equal spacing from, an axis and subject only to precession movement, being energized alternately or in sequence by electromagnetic induction, which in turn generates superconduction that accelerates the flow of electrons on the surface of the superconductors to relativistic velocities, with the aim of dilating their masses, in order to generate a controllable macroscopic quantum angular momentum.

3. "INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR" characterized by having only one superconductor element (16) energized alternately or in sequence at two or more points distributed around the rotation axis, maintaining equal spacing. This localized electromagnetic energizing generates superconduction which accelerates the flow of electrons on the surface of the superconductor to relativistic velocities, with the aim of dilating their masses, in order to generate a controllable macroscopic quantum angular momentum.

4. "INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR", according to claims 1, 2 or 3, characterized by having an angle Φ, which indicates the inclination of the axis of rotation of the superconductor elements and/or of the electrons in circular motion, in relation to the precession axis, which can have any value greater than 0° and less than 180°, whether fixed or variable.

5. "INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR", according to claims 1 to 4, characterized by having been built using super

conductors which possess any other geometric forms not presented, which has as its principal purpose the achievement of a high and controllable moment of inertia or angular momentum, while permitting easy energization and achieving different gravitational effects.

6. **"INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR"**, according to claims 1 to 5, characterized by the fact that it can be controlled by an electronic device which uses waveform layouts different to those presented, with the intention of energizing the superconductor elements through the induction of magnetic fields or through the application of a voltage directly to the superconductor, for any value of the frequency θ utilized.

7. **"INERTIA GENERATOR OR ANTI-GRAVITATIONAL ROTOR"**, according to claims 1 to 6, characterized by the fact that it could be incorporated as an active or passive element in any type of system, machine, appliance or equipment, whether it be for industrial, commercial, residential, aerospace, medical, military, communications, leisure, transport or general services.

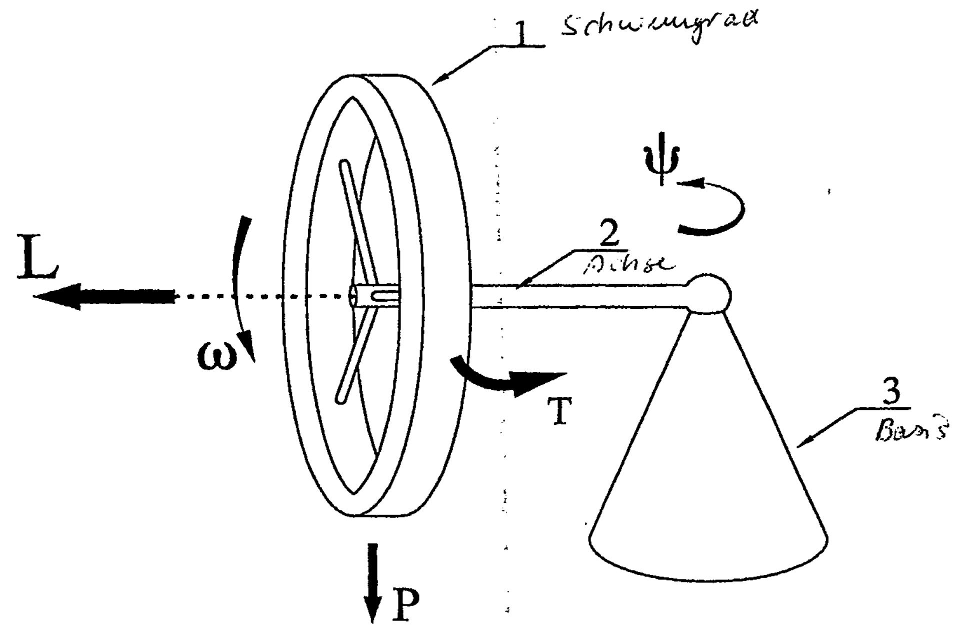

Fig. 1

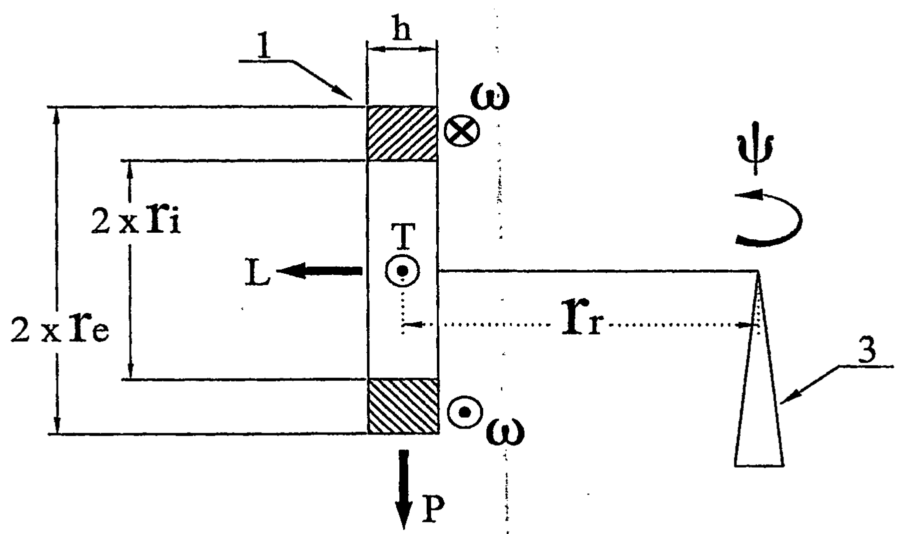

Fig. 2

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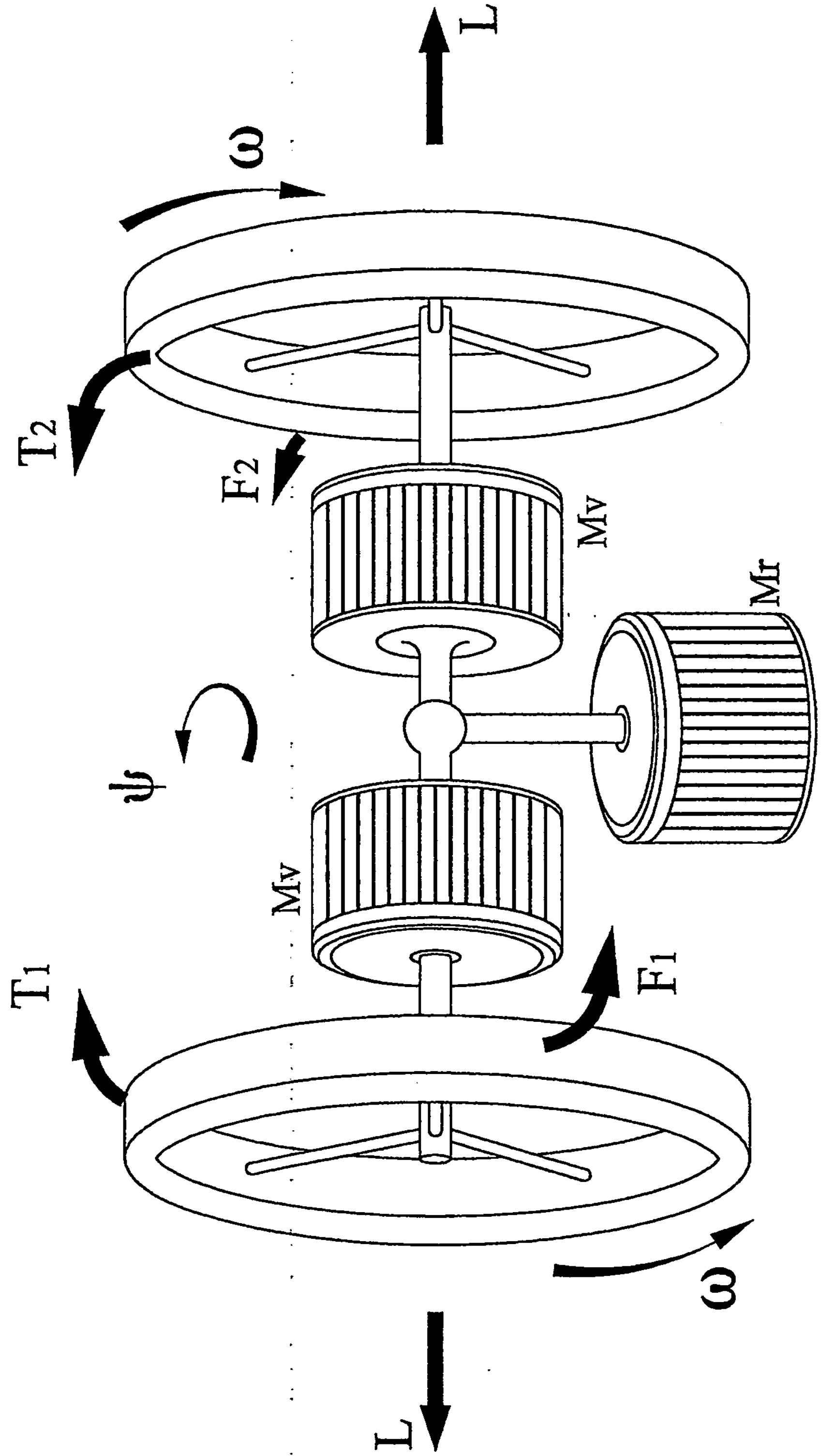
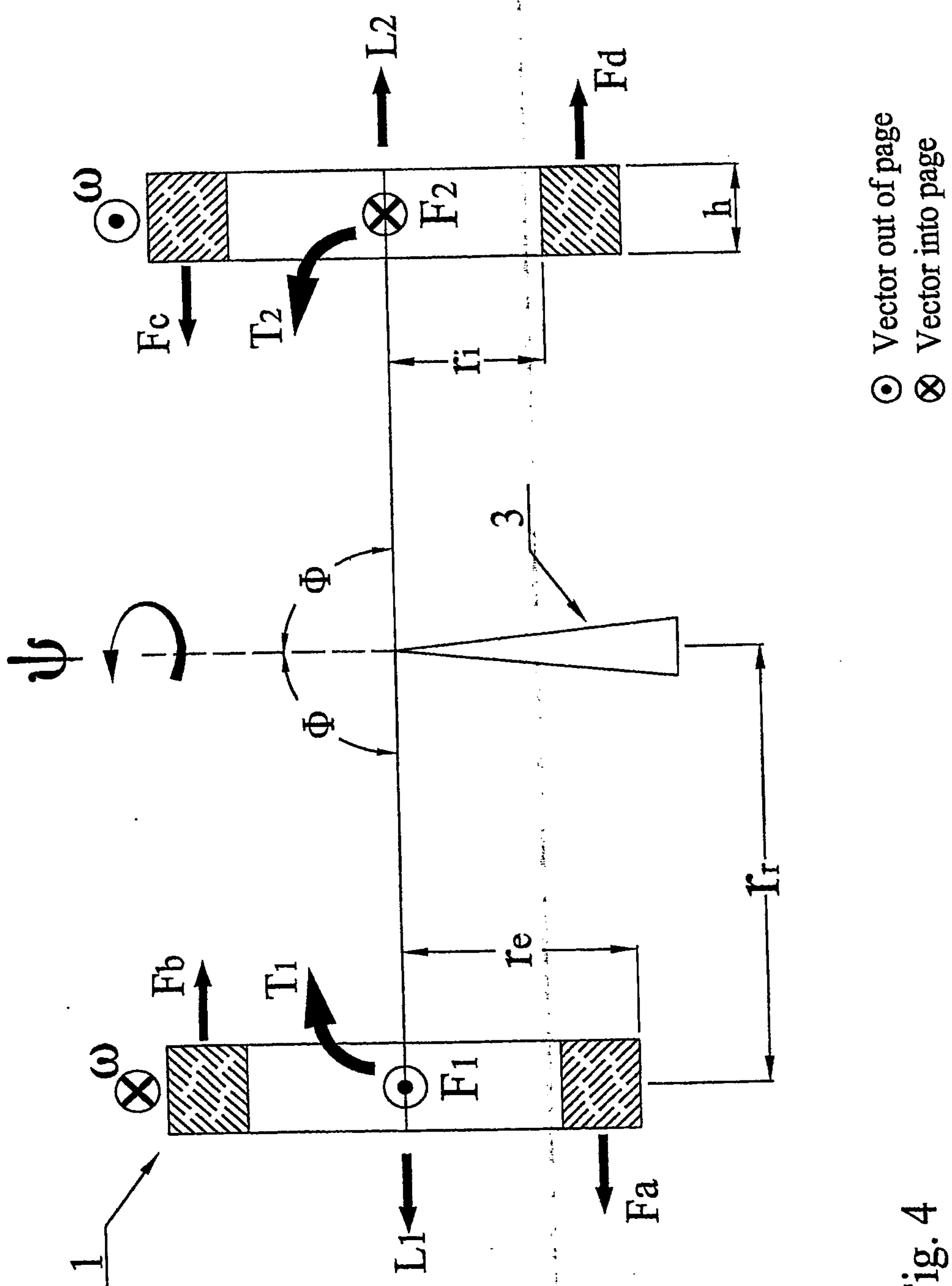


Fig. 3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ω
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Fd
Fc
F_2
T_2
h
ri
Φ
Φ
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Fa
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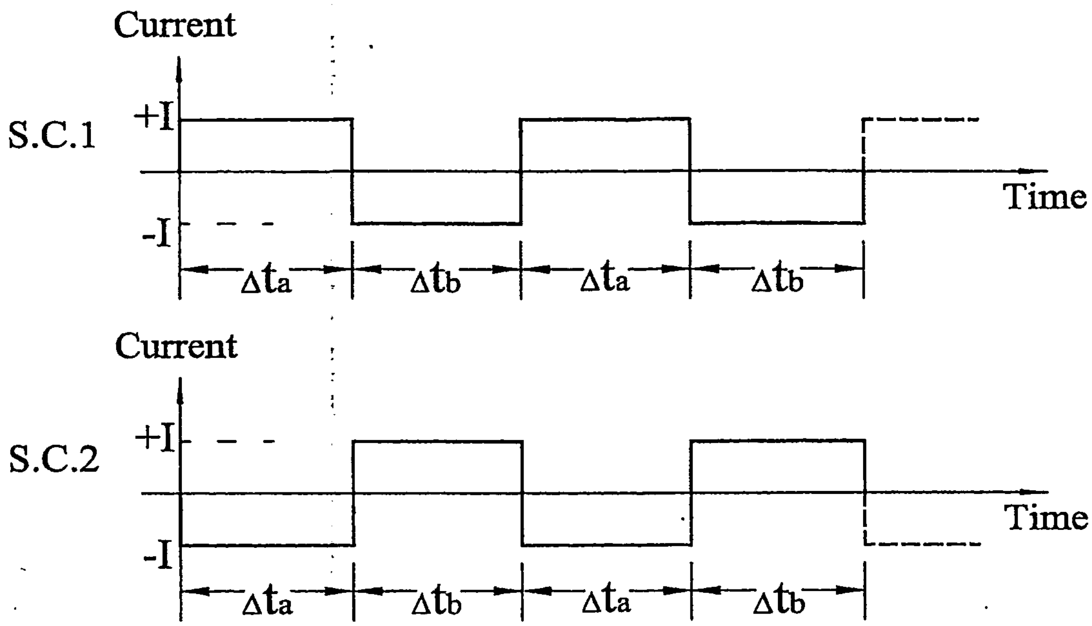
Fig. 4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-I
Time
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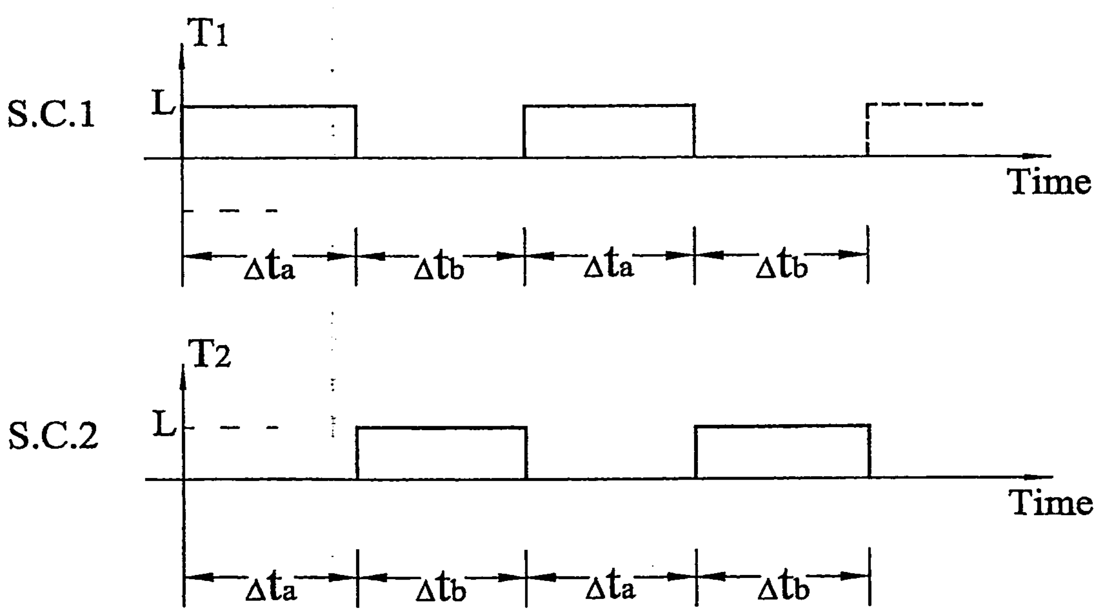
Δtb
Δta
Δtb
Current
S.C.2
+I
-I
Time
Δta
Δtb
Δta
Δtb

Fig. 5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S.C.1
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Time
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Δtb
Δta
Δtb
T2
S.C.2
L
Time
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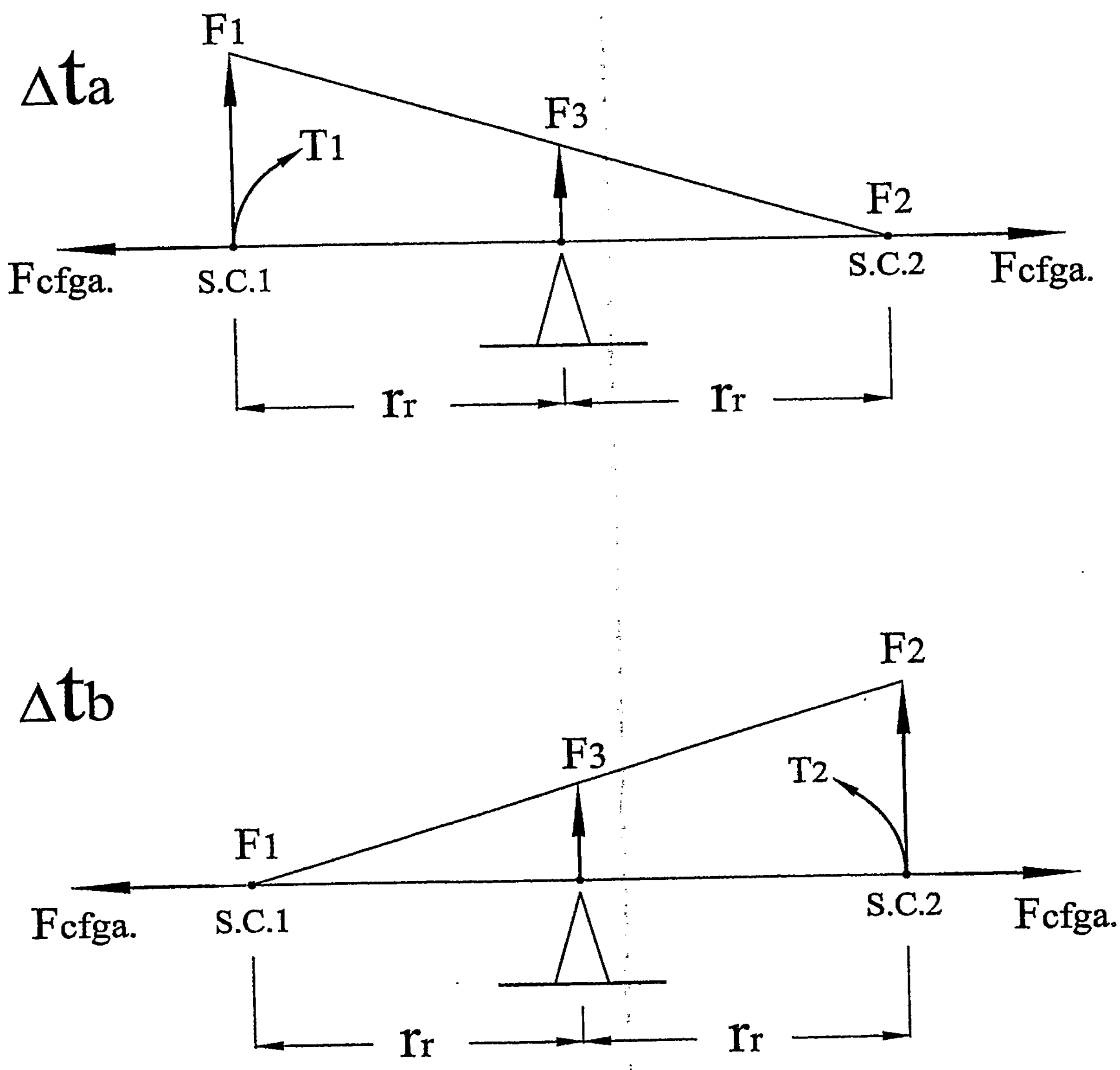
Δta
Δtb

Fig. 6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Fcfga.
rr
rr

Fig. 7

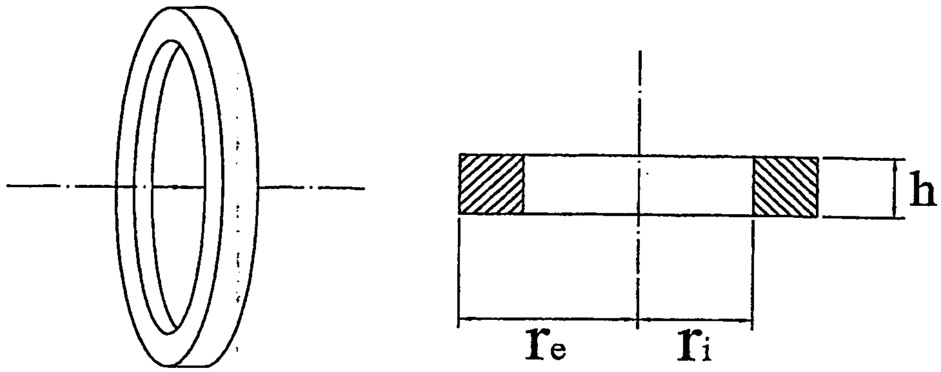


Fig. 8

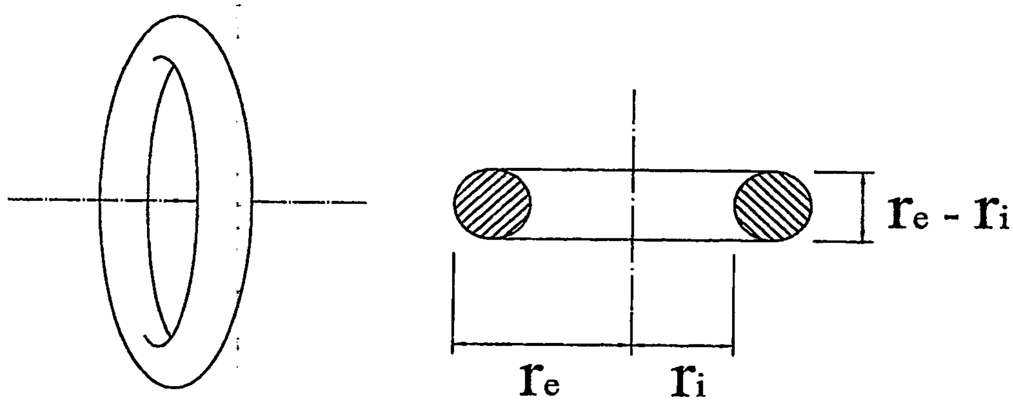


Fig. 9

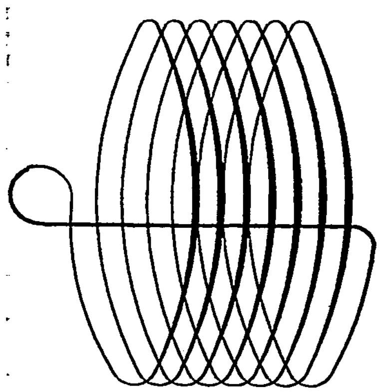


Fig. 10

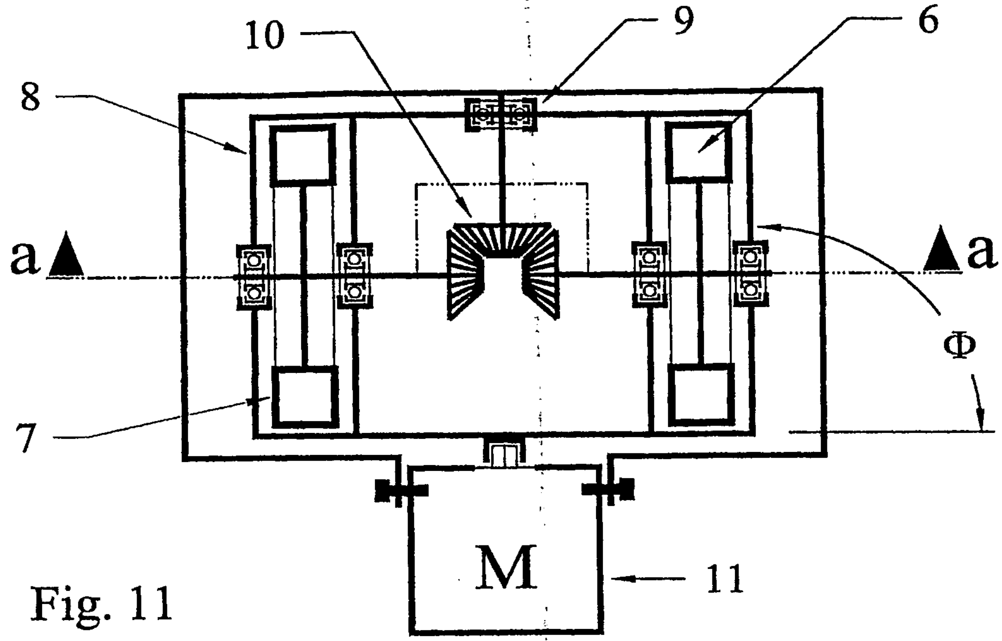


Fig. 11

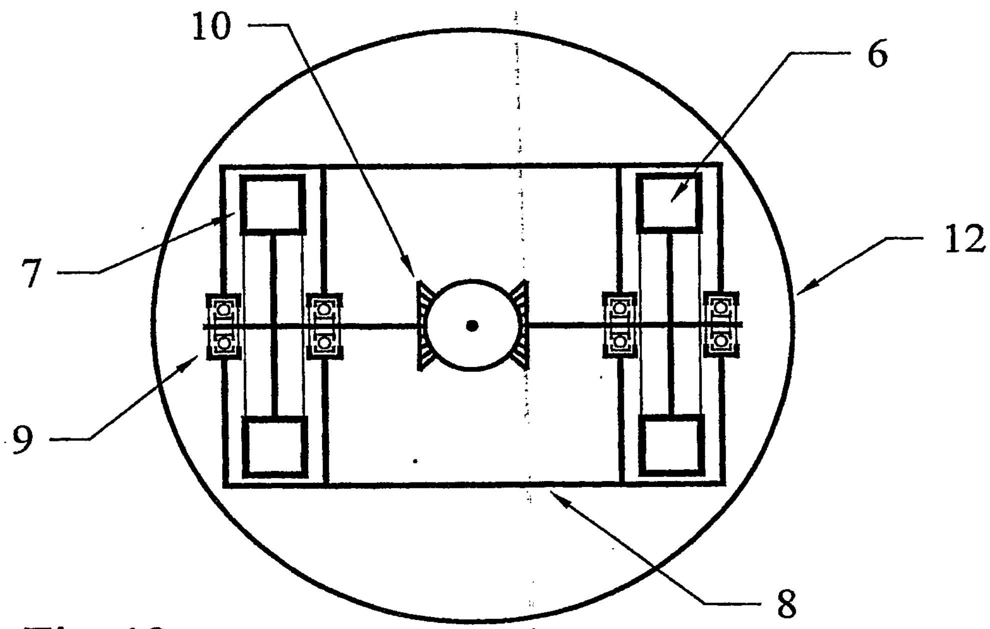


Fig. 12

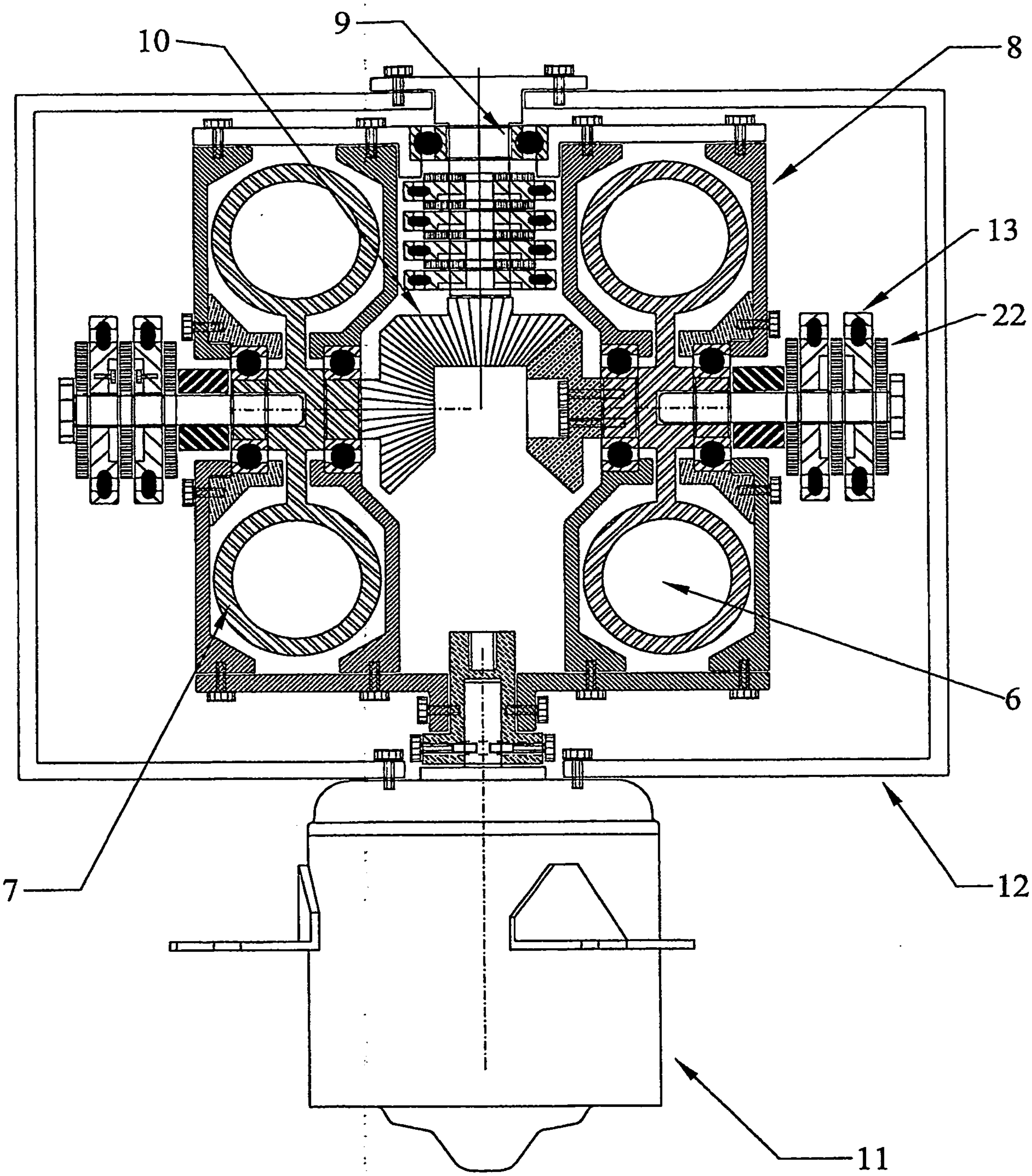


Fig. 13

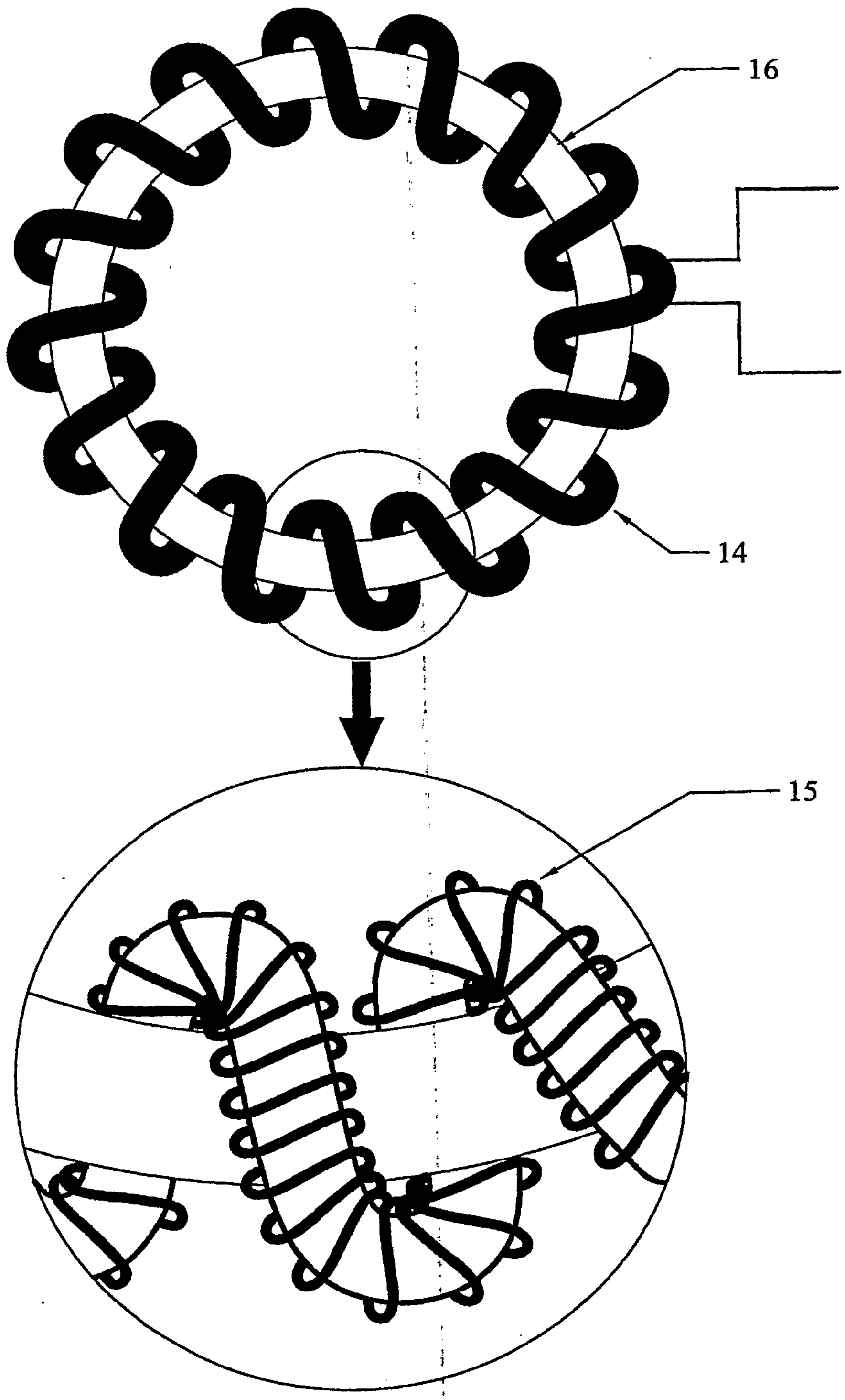


Fig. 14

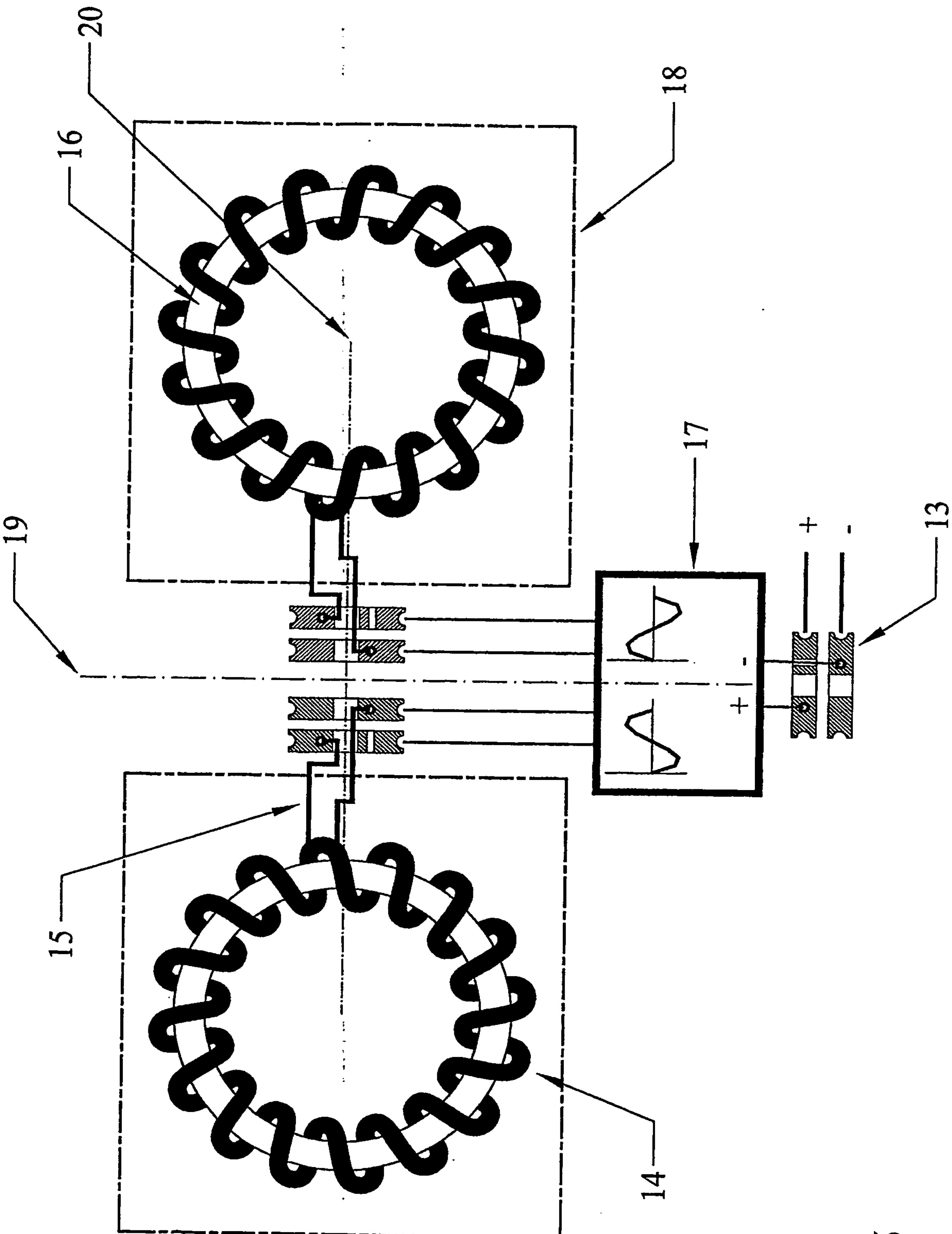


Fig. 15

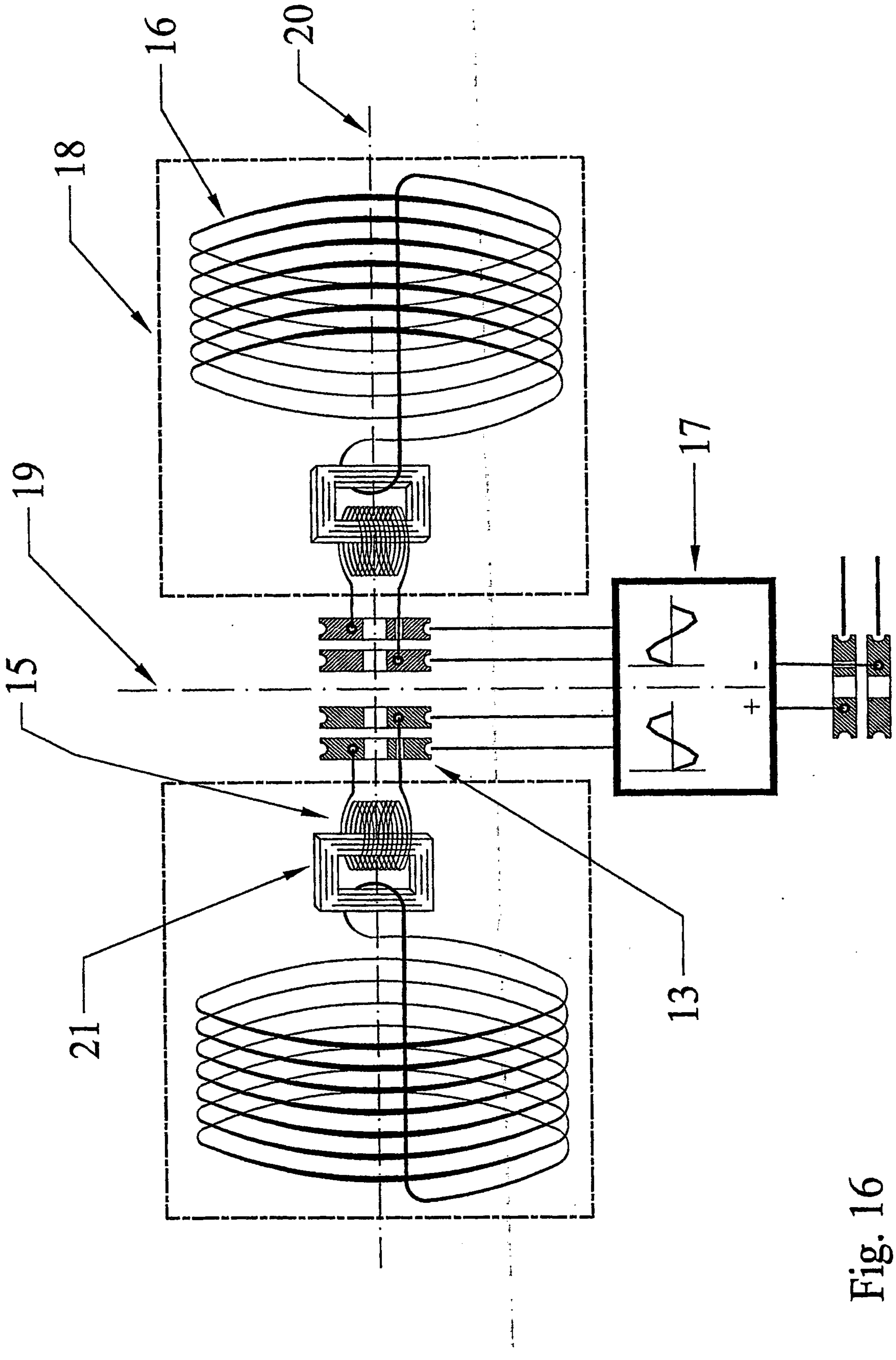


Fig. 16

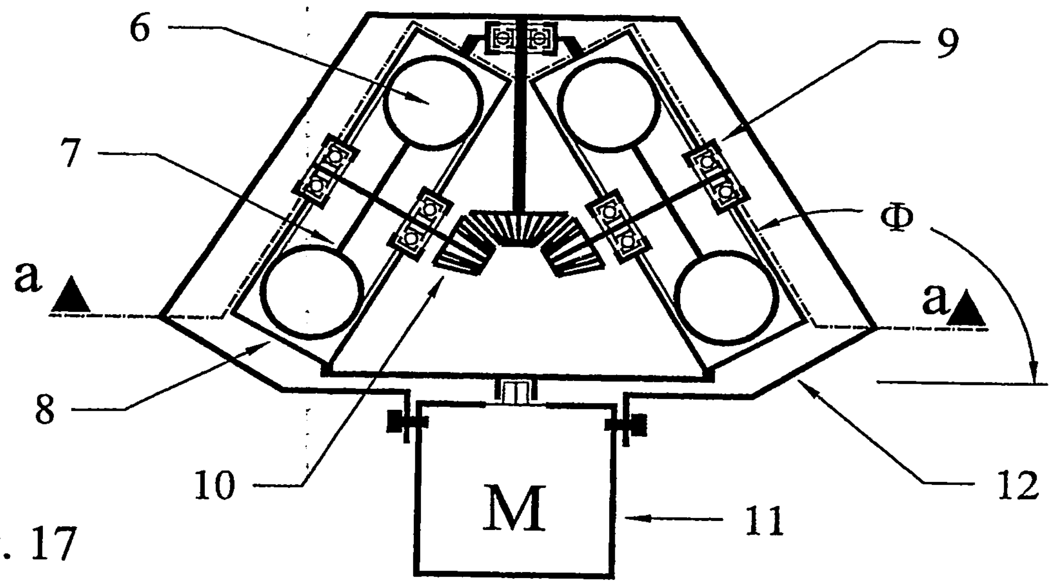


Fig. 17

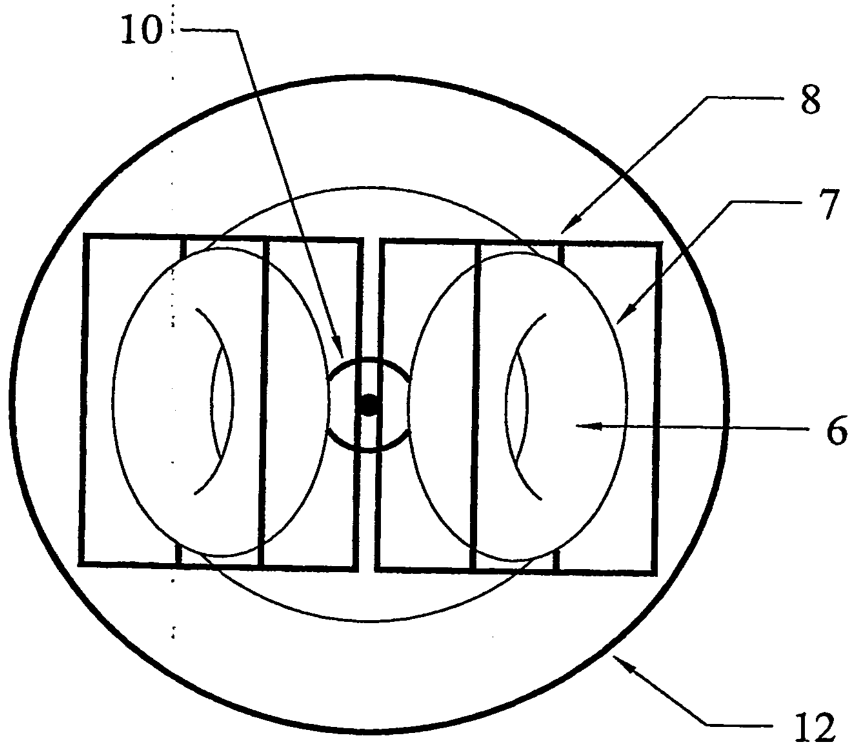


Fig. 18

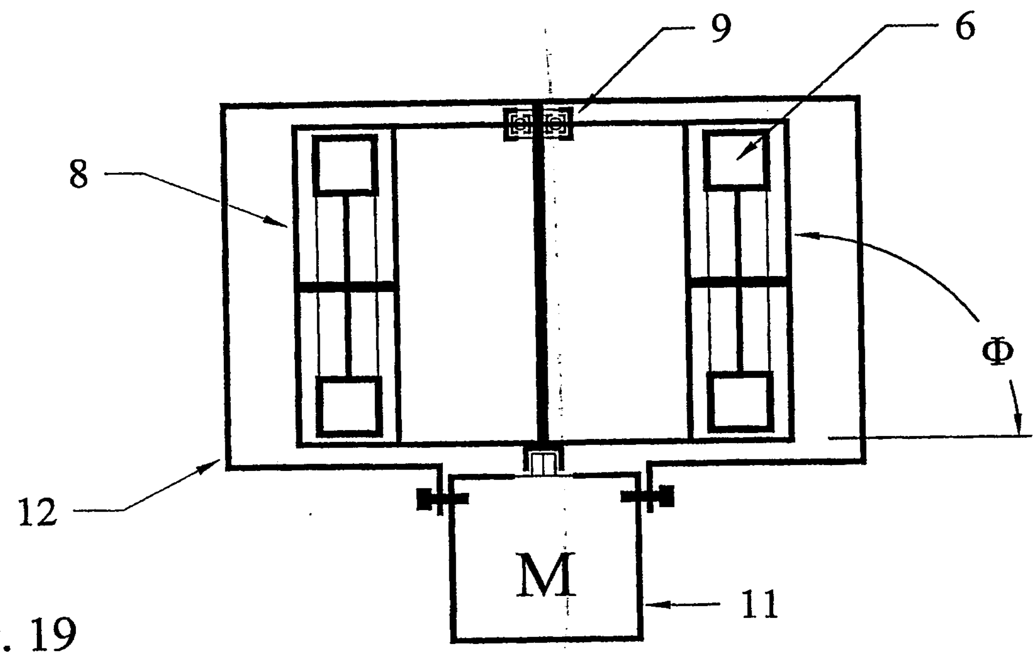


Fig. 19

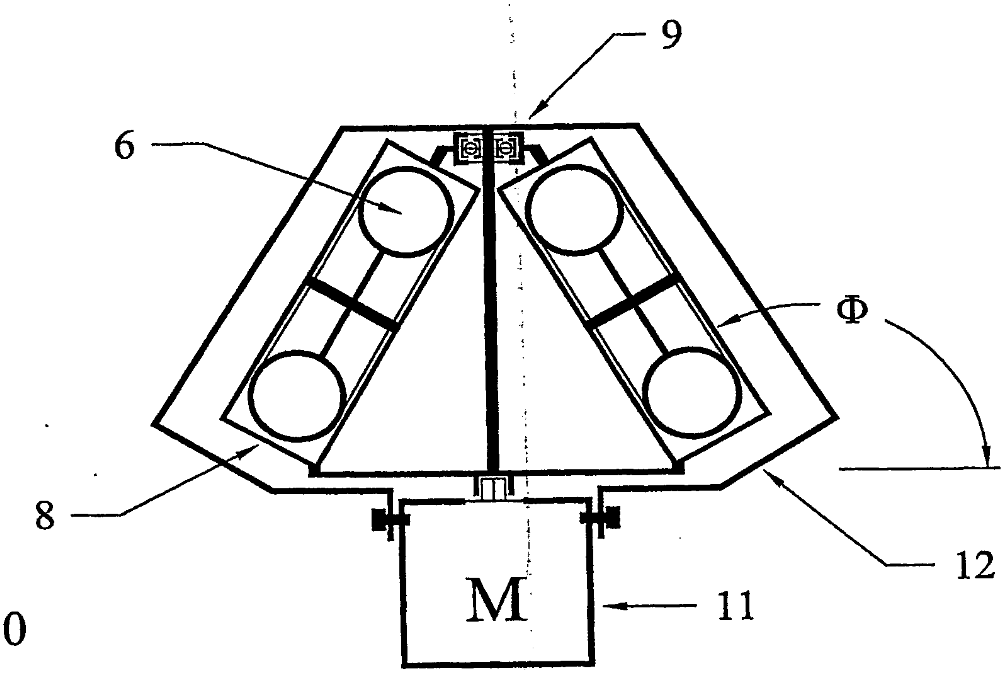


Fig. 20

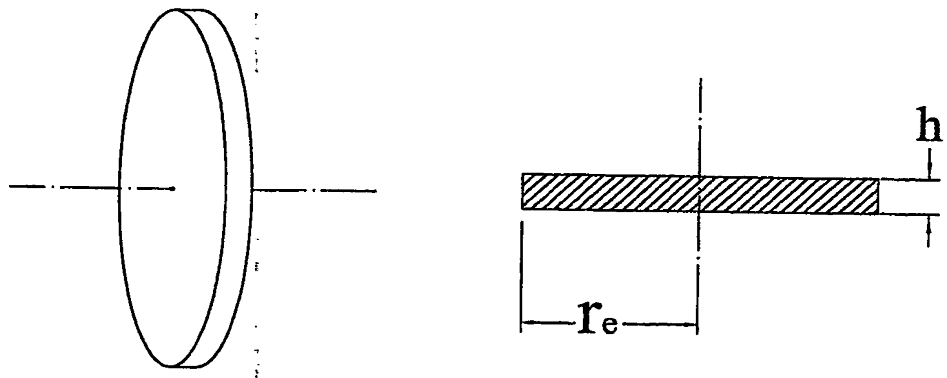


Fig. 21

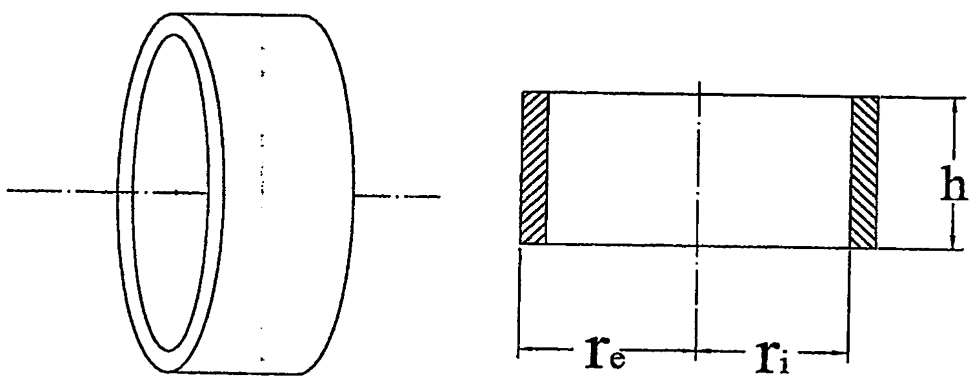


Fig. 22

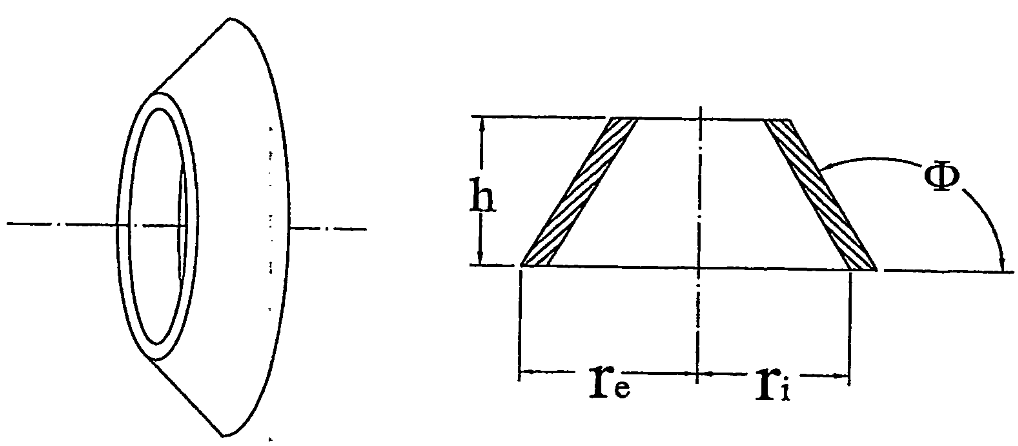


Fig. 23

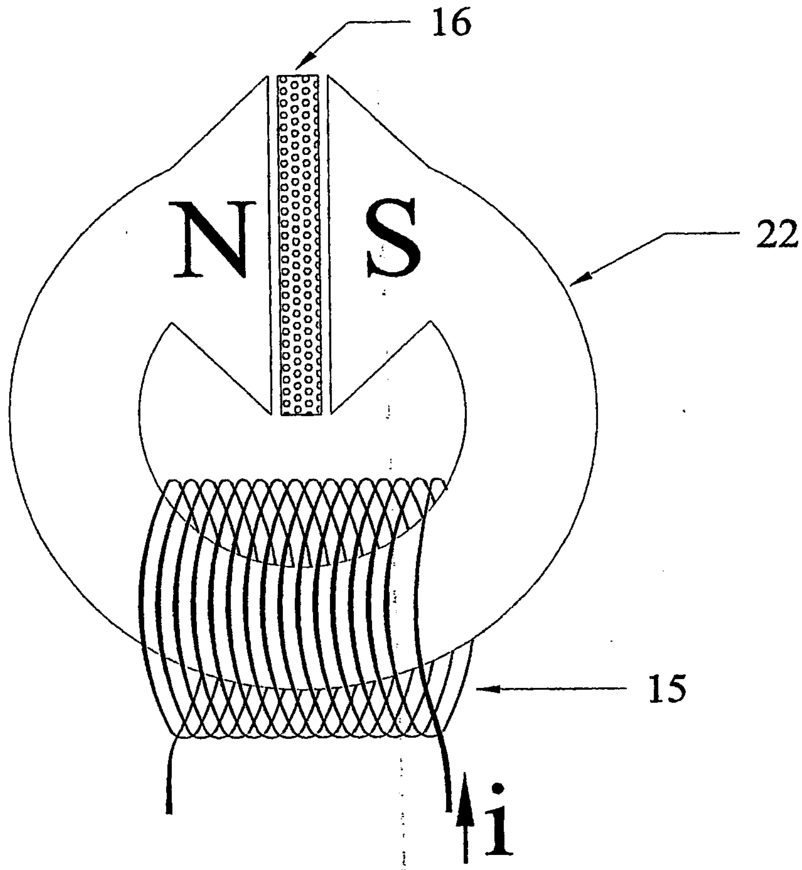


Fig. 24

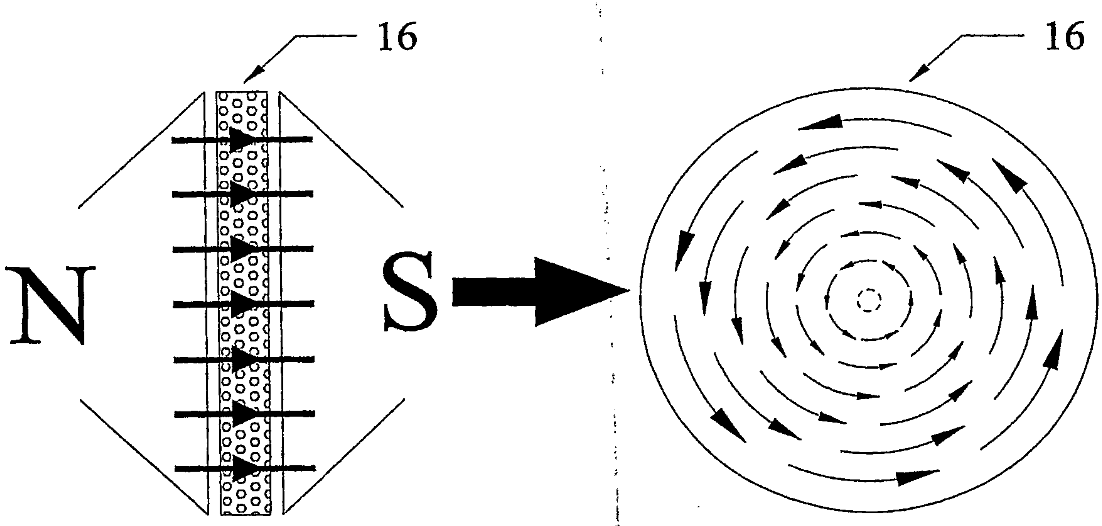
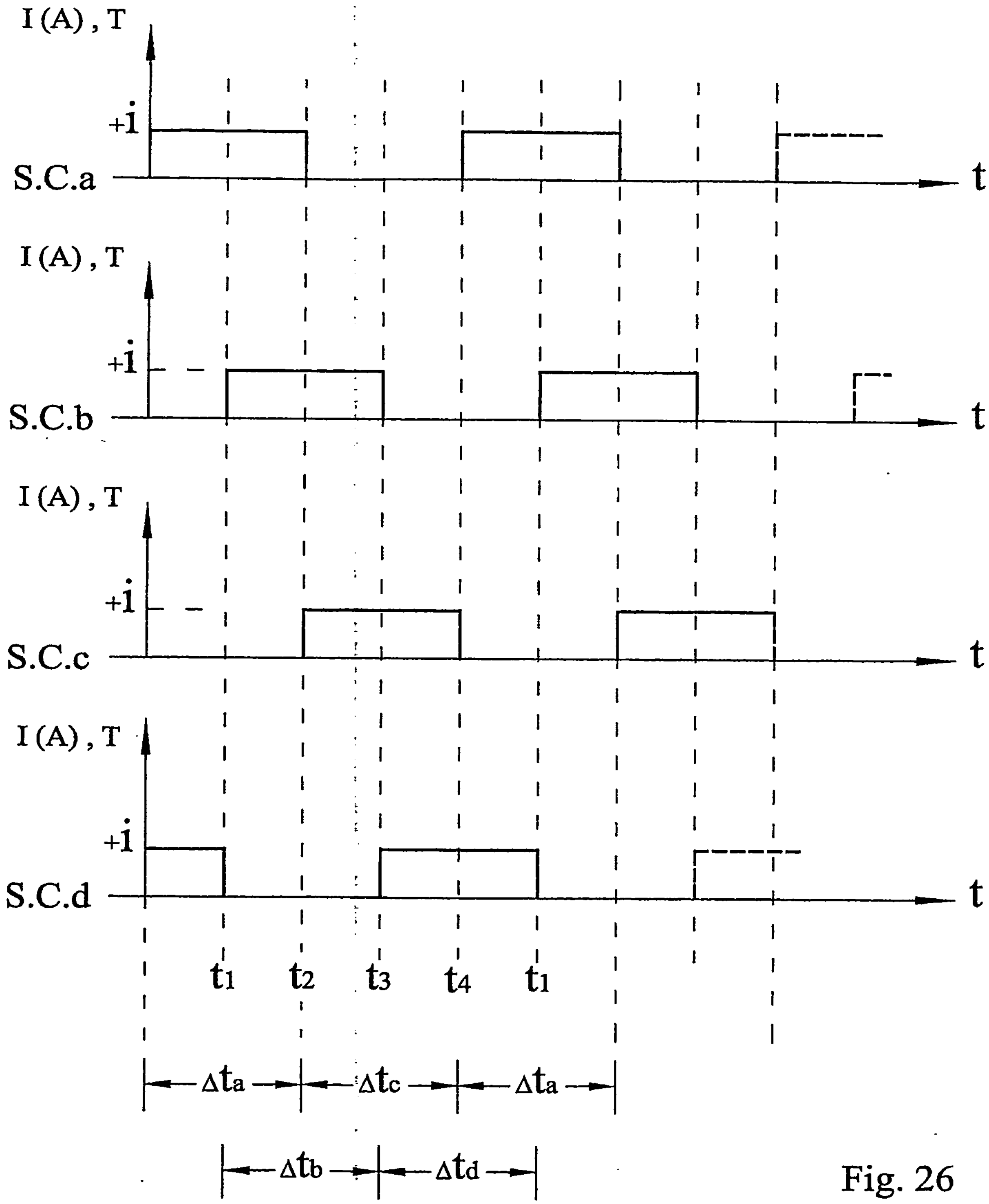


Fig. 25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t
I (A) , T
+i
S.C.b
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I (A) , T
+i
S.C.c
t
I (A) , T
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S.C.d
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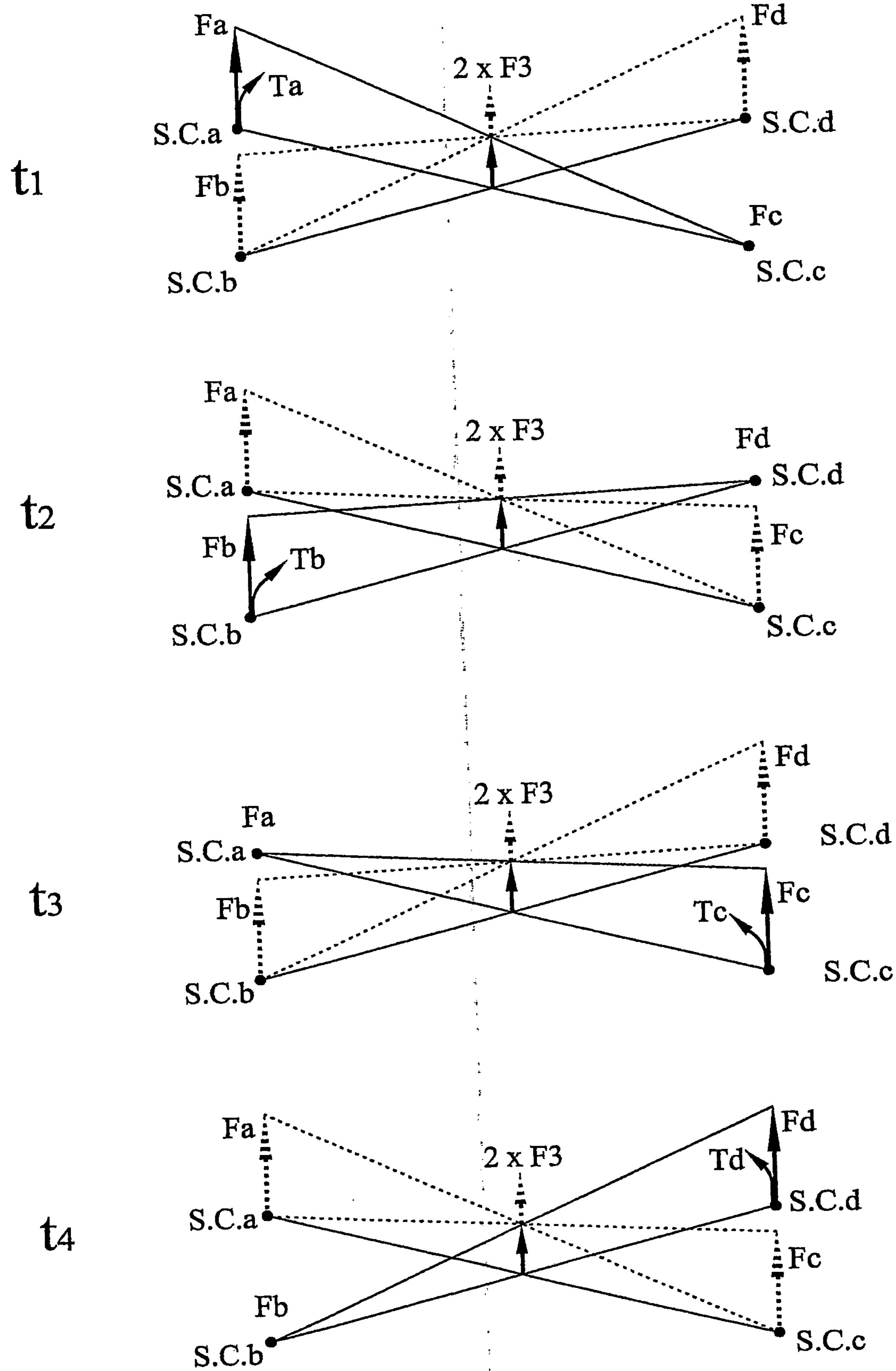
Fig. 26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Ta
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Fb
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Fd
S.C.a
S.C.d
t2
Fc
Fb
Tb
S.C.b
S.C.c
Fd
2 x F3
Fa
S.C.d
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Fig. 27

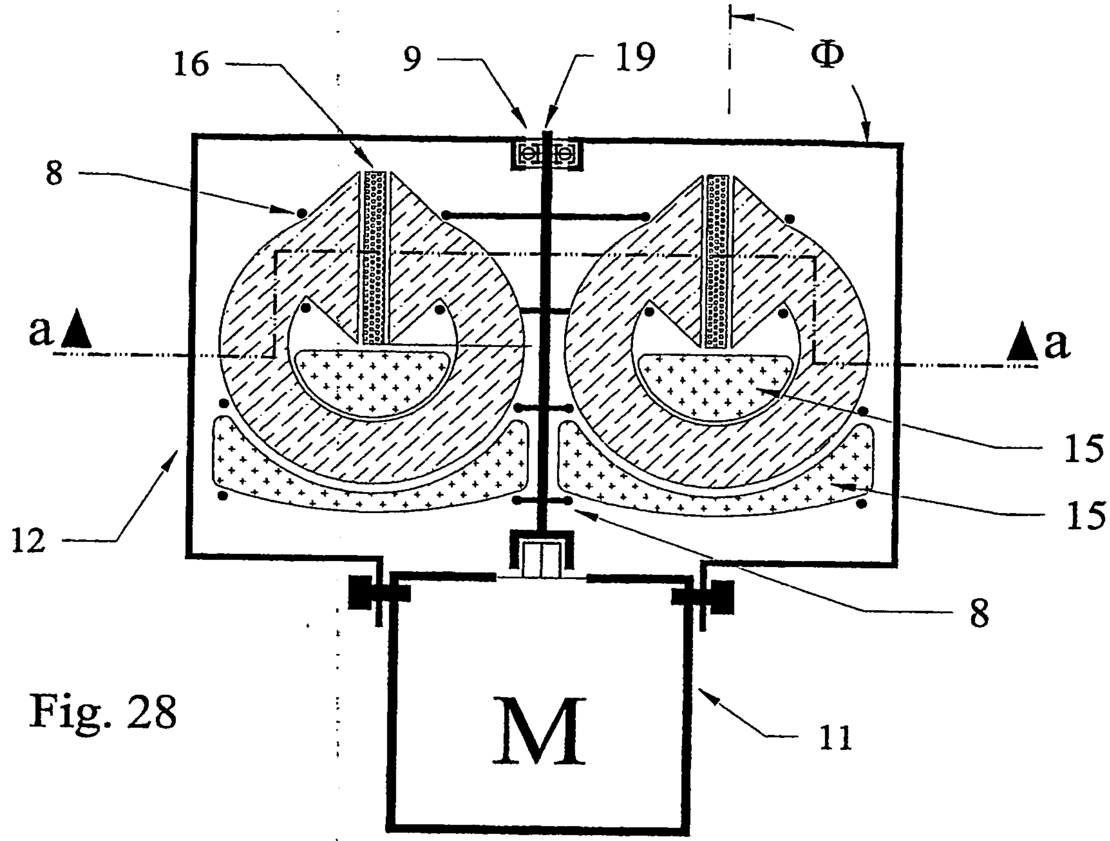

Fig. 28

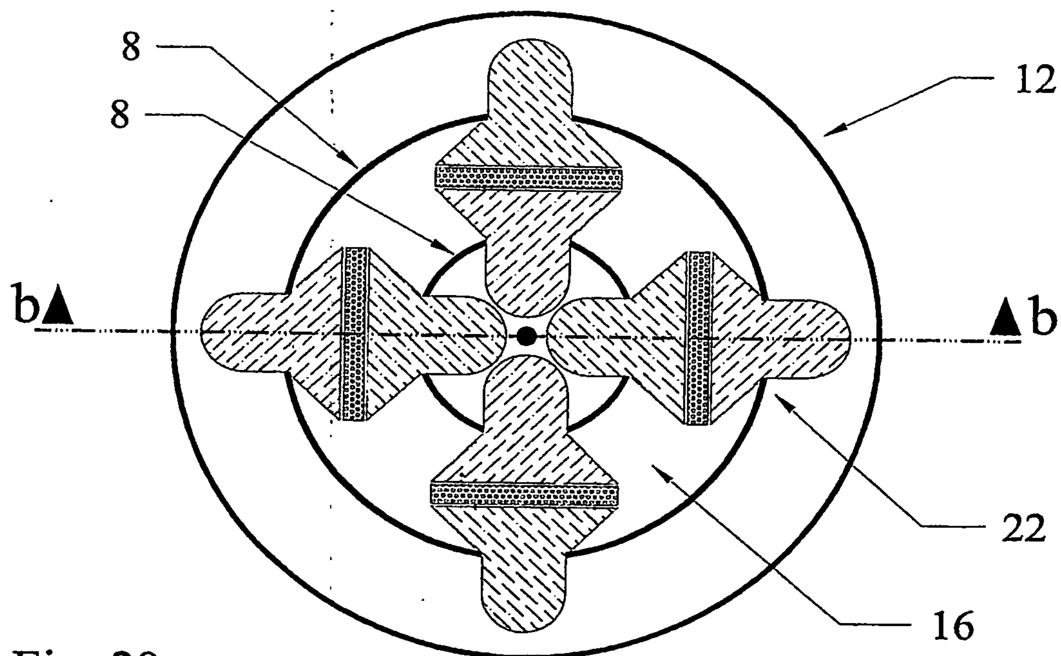

Fig. 29

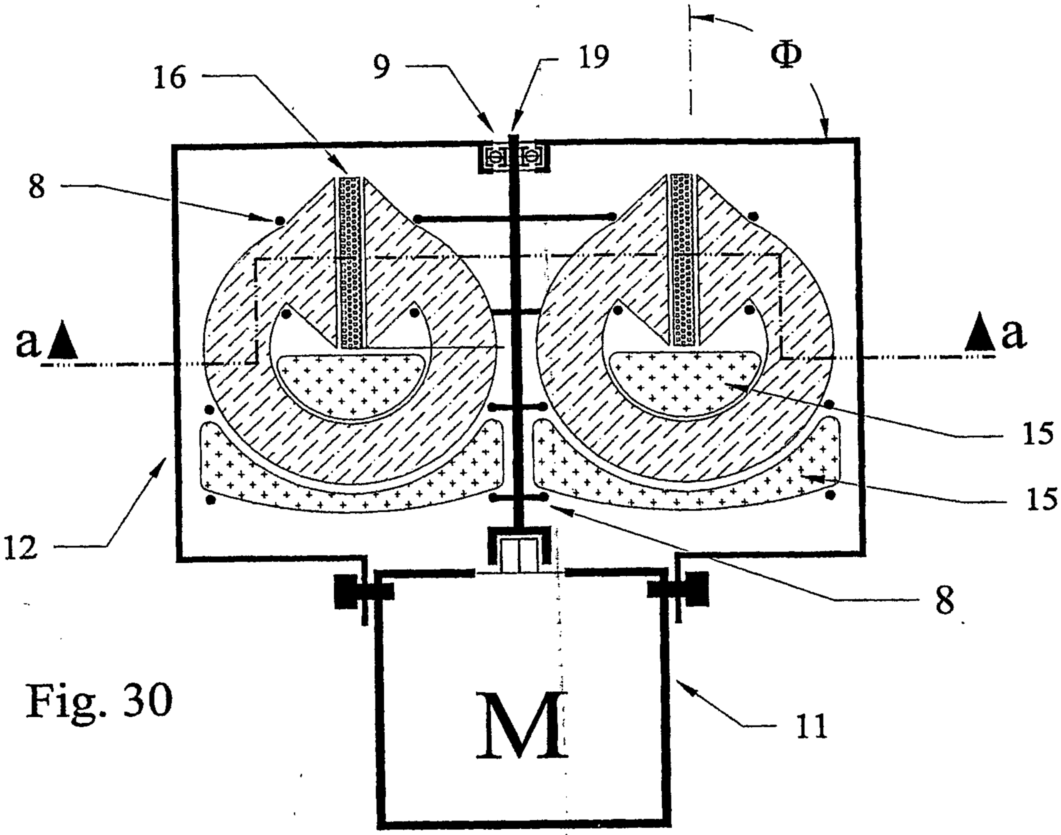

Fig. 30

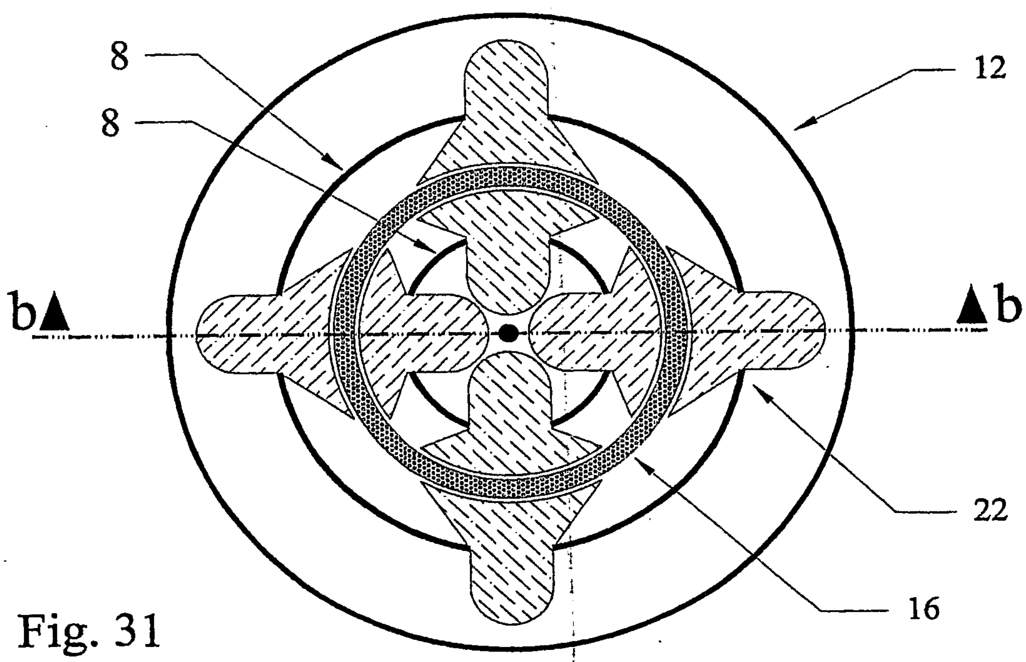

Fig. 31

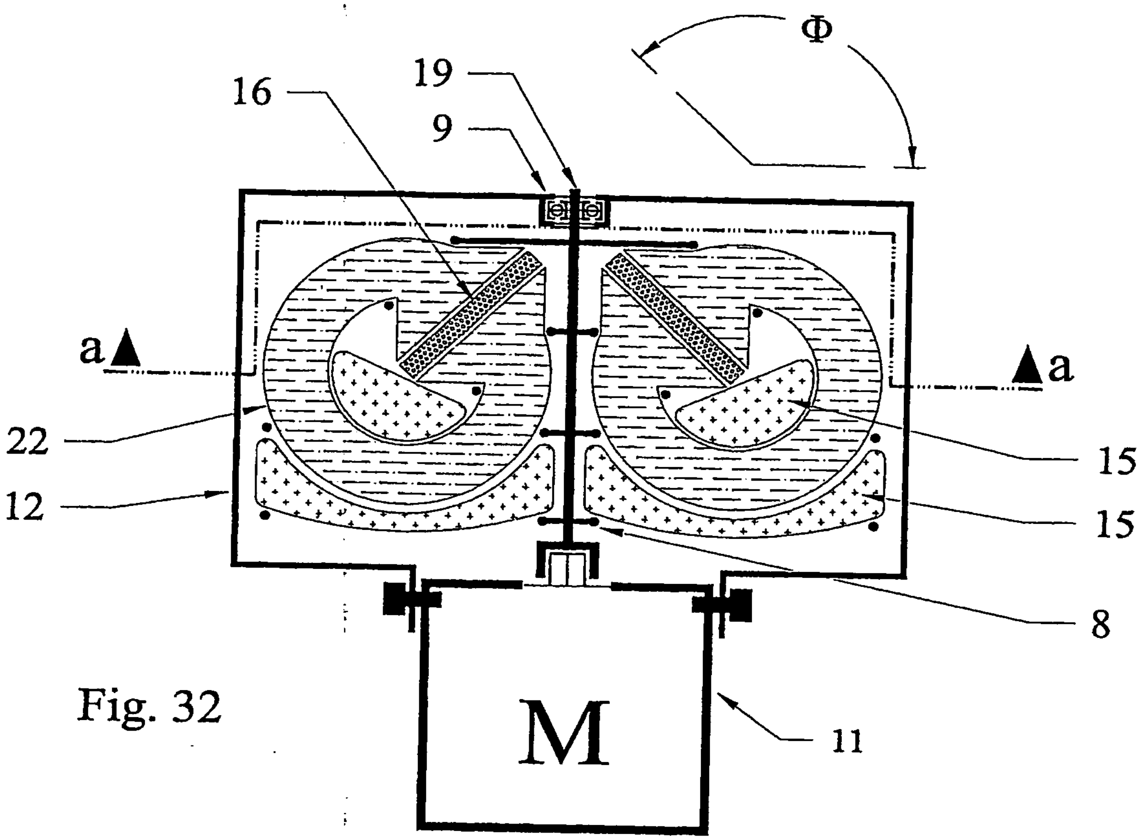

Fig. 32

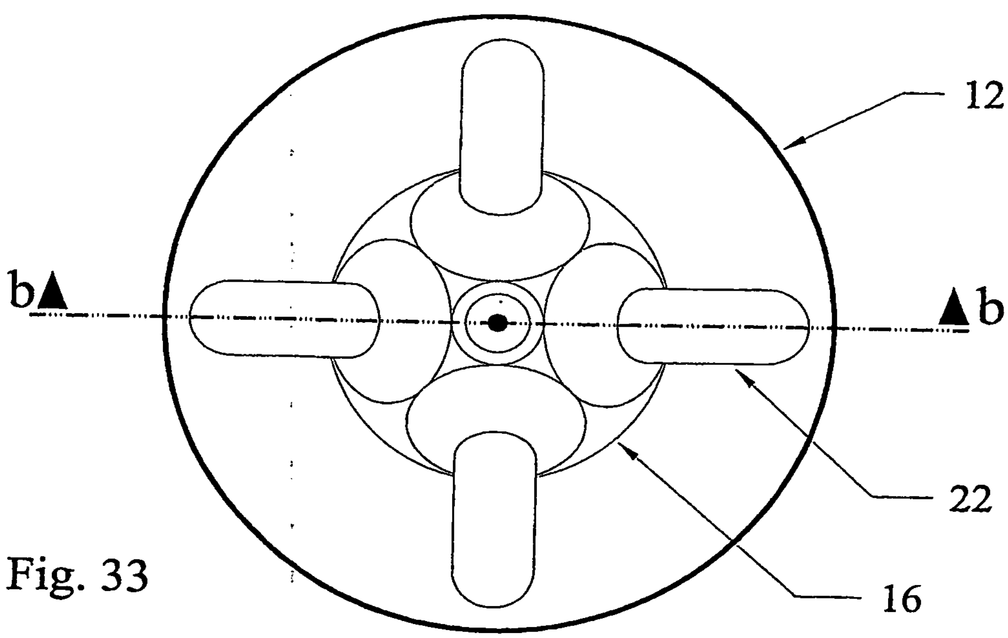

Fig. 33